Chemical Sampling Information
Field Label Abbreviations & Descriptions

FIELD LABEL ABBREVIATIONS INDEX

BACKGROUND

IDENTIFICATION, DESCRIPTION AND PHYSICAL PROPERTIES
NM - Chemical Name
SYN - Synonyms
IMIS - IMIS Code
CAS - CAS Number (Chemical Abstracts Service Registry Number)
NIOSH - Registry of Toxic Effects (RTECS) id number
DOT - Department of Transportation Regulation Number
DESC - Description & Physical Properties of a Chemical
INCOM - Incompatibilities

EXPOSURE LEVELS
OSHA - OSHA Permissible Exposure Limit (PEL)
TLV - ACGIH Threshold Limit Value
REL - NIOSH Recommended Exposure Limit
AIHA - AIHA Weel

CARCINOGEN STATUS
NTP - Carcinogenic Classification from National Toxicology Program
IARC - Carcinogenic Classif. from Intern. Agency for Research on Cancer

HEALTH EFFECTS AND TOXICOLOGY
SYMPT - Symptoms
ORG - Organs Effected
HLTH - Health Code & Health Effects

SAMPLING AND ANALYSIS
SLC1 - Primary Sampling Method
WOHL - Wisconsin Occupational Health Laboratory Methods
SAM2 - Secondary Sampling Method
WIPE - Wipe Sampling
COND. - Analytical Conditions
ART - Articles

GENERAL REFERENCES

LABEL DESCRIPTIONS AND REFERENCES

BACKGROUND

This file presents, in concise form, data on a large number of chemical substances that may be encountered in industrial hygiene investigations. It is intended as a basic reference for industrial hygienists engaged in OSHA field activity. **Labels are shown bolded throughout this document.**

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

IDENTIFICATION, DESCRIPTION AND PHYSICAL PROPERTIES

NM, the substances are primarily listed by the Chemical name as it appears in the OSHA PELs, 29 CFR 1910.1000, TABLES Z-1-A, Z-2, Z-3; the ACGIH TLV's; or by common name.

SYN, synonyms, only the more common synonyms are included. Sources: OSHA PELs, 29 CFR 1910.1000; ACGIH TLV LIST; and NIOSH REGISTRY OF TOXIC EFFECTS.

IMIS, IMIS No., the substance code currently assigned by OSHA to each substance. IMIS Codes are used for completion of OSHA-93, OSHA-98, OSHA-91(S), and OSHA-170. IMIS Codes are also reported on pre-printed OSHA-91B when only field measurements such as gravimetric are reported.

CAS, CAS nos., Chemical Abstracts Service Registry Numbers. Sources: NIOSH REGISTRY OF TOXIC EFFECTS; EPA TSCA INVENTORY.

NIOSH, REGISTRY OF TOXIC EFFECTS (RTECS) identification no.

DOT, Department of Transportation regulation no., as listed in the Department of Transportation Regulations (49 CFR 172.101) and NIOSH POCKET GUIDE TO CHEMICAL HAZARDS.

DESC, description and physical properties of a chemical, extracted from MERCK INDEX; CONDENSED CHEMICAL DICTIONARY; and NIOSH/OSHA HEALTH GUIDELINES.

MW:	molecular weight
VP:	vapor pressure, (mm = mm Hg at 20°C or other specific temperature listed, also 1 mm Hg = 1.333224 E+2 Pa)
ATM:	atmosphere, 760 mm at 0°C
UEL:	upper explosibility limit
SP GR:	specific gravity
MOLFM:	molecular formula
BP:	boiling point
FP:	flash point

INCOM, potentially hazardous incompatibilities. Sources: NIOSH Pocket Guide to Chemical Hazards and Material Safety Data Sheets (MSDSs)

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

EXPOSURE LEVELS

OSHA, OSHA Permissible Exposure Limit (PEL) - Action Level, Excursion Limit (EL), 8-Hour Time Weighted Average (TWA), Short Term Exposure Limit (STEL), Ceiling, or Stayed. Includes all changes to 29 CFR 1910.1000 to end published in the Federal Register.

TLV, American Conference of Governmental Industrial Hygienists Threshold Limit Value.

REL, NIOSH Recommended Exposure Limit.

AIHA, American Industrial Hygiene Association Workplace Environmental Exposure Limits.

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

CARCINOGEN STATUS

NTP, carcinogenic classification as listed in the Nationa Toxicology Program (NTP), FIFTH ANNUAL REPORT ON CARCINOGENS.

HUMAN CARCINOGEN: known to be carcinogenic with evidence from human studies.

SUSPECT HUMAN CARCINOGEN: reasonably anticipated to be carcinogenic, with limited evidence from humans or sufficient evidence from experimental animals.

IARC, carcinogenic classification as indicated by International Agency for Research on Cancer (IARC), IARC MONOGRAPHS ON THE EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO HUMANS. Data includes chemicals covered through Volume 46.

Group 1 - "The agent is carcinogenic to humans". This category is used only when there is sufficient evidence of carcinogenicity in humans.

Group 2A - "The agent is probably carcinogenic to humans". This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals. Exceptionally, an agent may be classified into this category solely on the basis of limited evidence of carcinogenicity in humans or of sufficient evidence of carcinogenicity in experimental animals strengthened by supporting evidence from other relevant data.

Group 2B - "The agent is possibly carcinogenic to humans". This category is generally used for agents for which there is the absence of sufficient evidence in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans or when human data are nonexistent but there is sufficient evidence of carcinogenicity in experimental animals. In some instances, an agent for which there is inadequate evidence or no data in humans but limited evidence of carcinogenicity in experimental animals together with supporting evidence from other relevant data may be placed in this group.

Group 3 - "The agent is not classifiable as to its carcinogenicity to humans". Agents are placed in this category when they do not fall into any other group.

Group 4 - "The agent is probably not carcinogenic to humans". This category is used for agents for which there is evidence suggesting lack of carcinogenicity in humans together with evidence suggesting lack of inogenicity in experimental animals. In some circumstances, agents for which there is inadequate evidence of or no data on carcinogenicity in humans but evidence suggesting lack of carcinogenicity in experimental animals, consistently and strongly supported by a broad range of other relevant data, may be classified in this group.

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

HEALTH EFFECTS AND TOXICOLOGY

SYMPT, potential symptoms as a result of inhalation, skin absorption, ingestion, or skin or eye contact. As listed in NIOSH Pocket Guide to Chemical Hazards (NIOSH No. 85-114), condensed from the NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards (NIOSH No. 81-123).

ORG, the organs which are affected by exposure to each substance. As listed in NIOSH Pocket Guide to Chemical Hazards (NIOSH No. 85-114), condensed from the NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards (NIOSH No. 81-123).

HLTH, Principal effect(s) of exposure of each substance, listed by OSHA Health Code and Health Effects. Health codes are used in determining if a violation of an air contaminant standard is serious or other-than- serious, based on guidelines in the Field Operations Manual, OSHA Instruction CPL 2.45B, chapter IV. Health Codes and Health Effects listed may not reflect changes in Air Contaminant Standards, 29 CFR Part 1910 Subpart Z, revised in 1989. All Health Codes and Health Effects are scheduled to be reviewed and updated under contract. For some chemicals, additional toxicology information has been added from other sources. Abbreviations for this information includes: SKIN IRR = Skin irritation; SKIN ABS = Skin Absorption; INGES ACUTE = Ingestion Acute; and INGES CHRONIC = Ingestion Chronic.

CODE	HEALTH EFFECTS
HE1	Cancer---Currently regulated by OSHA as carcinogen
HE2	Chronic (Cumulative) Toxicity---Known or Suspected animal or human carcinogen, mutagen (except Code HE1 chemicals)
HE3	Chronic (Cumulative) Toxicity---Long-term organ toxicity other than nervous, respiratory, hematologic or reproductive
HE4	Acute Toxicity---Short-term high risk effects
HE5	Reproductive Hazards---Teratogenesis or other reproductive impairment
HE6	Nervous System Disturbances---Cholinesterase inhibition
HE7	Nervous System Disturbances---Nervous system effects other than narcosis
HE8	Nervous System Disturbances---Narcosis
HE9	Respiratory Effects Other Than Irritation---Respiratory sensitization (asthma or other)
HE10	Respiratory Effects Other Than Irritation---Cumulative lung

	damage
HE11	Respiratory Effects---Acute lung damage/edema or other
HE12	Hematologic (Blood) Disturbances---Anemias
HE13	Hematologic (Blood) Disturbances---Methemoglobinemia
HE14	Irritation-Eyes, Nose, Throat, Skin---Marked
HE15	Irritation-Eyes, Nose, Throat, Skin---Moderate
HE16	Irritation-Eyes, Nose, Throat, Skin---Mild
HE17	Asphyxiants, Anoxiants
HE18	Explosive, Flammable, Safety (No adverse effects encountered when good housekeeping practices are followed
HE19	Generally Low Risk Health Effects---Nuisance particulates, vapors or gases
HE20	Generally Low Risk Health Effects---Odor

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

SAMPLING AND ANALYSIS

SLC1, Salt Lake Technical Center sampling method for OSHA compliance.

MEDIA, sampling media.

ANL SOLVENT, Analytical solvent used in referenced method for desorption or extraction. If compounds to be sampled use the same media and also use the same analytical or alternate solvent, they may be analyzed from the same sample.

ALT SOLVENT, Alternate solvent for desorption or extraction evaluated at Salt Lake Technical Center. If compounds to be sampled use the same media and also use the same analytical or alternate solvent, they may be analyzed from the same sample.

Volumes listed are guidelines but should not be exceeded for solid sorbents.

```
MAX V,   maximum volume
MAX F,   maximum flow rate
MIN V,   minimum volume
REC V,   recommended volume
REC F,   recommended flow rate
MIN T,   minimum time
CAPTURE R,   capture rate
```

ANL 1, current Salt Lake Technical Center analytical method

ANL A, alternate Salt Lake Technical Center analytical method

REF, method reference. *(numbered, as listed in both SLC1 and SAM2)*

1. Taylor, D.G., Ed.: NIOSH MANUAL OF ANALYTICAL METHODS, 2nd Ed., Volume 1-7. DHHS, National Institute for Occupational Safety and Health, Cincinnati, Ohio.

2. OSHA MANUAL OF ANALYTICAL METHODS, USDOL OSHA Salt Lake Technical Center (SLTC), 1781 S. 300 W., Salt Lake City, UT 84165-0200. This manual contains most of the Fully Validated methods and is available from ACGIH, 6500 Glenway, Bldg. D-7, Cincinnati, OH 45211, call (513) 743-2020 for details. Information on chemicals that are not Fully Validated is generally available through SLTC personnel.
3. McLean, J.D. and Holland, J.F.: Development of a Portable Polarograph for Determination of Aldehydes in Automotive Exhaust and Production Plant Samples. ENVIRONMENTAL SCIENCE AND TECHNOLOGY, Vol. 9, pp. 127-131, (1975).
4. Mattocks, A.R.: Spectrophotometric Determination of Pyrazoline and Some Acrylic Amides and Esters. ANAL. CHEM., Vol. 40, pp. 1347, (1968).
5. ANALYSIS OF PESTICIDE RESIDUES IN HUMAN AND ENVIRONMENTAL SAMPLES. EPA, Pesticide and Toxic Substances Effects Laboratory, Research Triangle Park, N.C., (1974).
6. ORION ELECTRODE INSTRUCTION MANUAL. Orion Research, Inc., Cambridge, Mass., (1971).
7. Thomsen, E. and Stern, R.M.: A Simple Analytical Technique for the Determination of Hexavalent Chromium in Welding Fumes and other Complex Materials. The Danish Welding Institute Report No. 79-01, SCAND. J. WORK. ENVIRON. & HEALTH, Vol. 5, pp. 386-403, (1979).
8. THE INDUSTRIAL ENVIRONMENT--ITS EVALUATION AND CONTROL. DHHS, National Institute for Occupational Safety and Health, Washington, D.C., (1973).
9. Brief, R.S., Venable, F.L.S., and Ajemian, R.S.: Nickel Carbonyl: Its Detection and Potential for Formation. Amer. Ind. Hyg. Assn. J., Vol. 26, pp. 72-76, (1965).
10. King, J.R., Nony, C.R., and Boeman, M.C.: Trace Analysis Diethylstilbestrol (DES) in Animal Chow by Parallel High-Speed Liquid Chromatography, Electron-Capture Gas Chromatography, and Radioassays. J. CHROMATOGRAPHIC SCIENCE, Vol. 15, pp. 14, (1977).
11. OSHA TECHNICAL MANUAL, OSHA Instruction CPL 2-2.20B, USDOL OSHA Directorate of Technical Support, Washington, D.C. (1990)
12. OCCUPATIONAL EXPOSURE SAMPLING STRATEGY MANUAL (77-173), DHHS, National Institute for Occupational Safety and Health, Cincinnati, Ohio, (1977).
13. Brief, R.S., Ajemian, R.S., and Confer, R.G.: Iron Pentacarbonyl: Its Toxicity, Detection, and Potential for Formation. AMER. IND. HYG. ASSN. J., Vol. 28, pp. 21-30, (1967).
14. Wisconsin Occupational Health Laboratory, 979 Jonathon Drive, Madison, Wis. 53713, (608)263-8807.
15. U.S. Code of Federal Regulations (CFR), Title 29, Part 1910, U.S. Government Printing Office, Washington, D.C.
16. Eller, P.E.: Determination of Nickel Carbonyl by charcoal tube collection and furnace atomic absorption spectrophotometry. APPL. IND. HYG. (1)3. Sept 1986 pp 115-118.

SAE, Sampling and Analytical Error. The SAE is a measure of the precision and accuracy of the combined sampling and analytical process. It shall be applied by the Industrial Hygienist to sample results according to the methods described in OSHA TECHNICAL MANUAL, OSHA Instruction CPL 2-2.20B. The values have been computed by multiplying the coefficient of variation by the appropriate statistical factor for one-sided 95-percent confidence intervals.

CLASS, method class.

FULLY VALIDATED: sampling and analytical method which has been thoroughly evaluated for collection efficiency, storage stability, sensitivity, precision and accuracy.

PARTIALLY VALIDATED: a method which has had limited evaluation of the above factors.

NOT VALIDATED: a method with limited or unverified information on the above factors.

Note: special instructions on sampling or obtaining sampling media from the Salt Lake Technical Center. These instruction pertain to OSHA and 18(b) or 7(c)(1) state programs.

WOHL, Wisconsin Occupational Health Laboratory Methods are listed for several substances in which WOHL methods differ from the OSHA method or an OSHA method does not exist. For more information concerning these methods, please contact Wisconsin Occupational Health Laboratory, 979 Jonathon Drive, Madison, WI 53713, Phone: (608)263-8807.

SAM2, Detector Tubes and Direct reading instrument information has not been reviewed, except as noted.

ANL, any analytical method used in conjunction with a secondary sampling method. Some of these are NIOSH methods which are not in use by Salt Lake Technical Center.

For other subheadings see SLC1 above.

DET TUBE, Detector Tubes are used for screening to determine whether additional sampling is needed. If detector tube readings exceed 1/2 the PEL, CSHOs should sample with the SLC1 method.

NOTE: OSHA has evaluated only a few detector tubes. OSHA evaluates detector tubes primarily to select tubes for OSHA use. OSHA does not certify detector tubes, nor endorse products of any manufacturer. Omission of other manufacturers tubes does not mean the tubes have been found unsatisfactory. OSHA may not have tested tubes of all manufacturers.

WIPE, Indicates whether wipe samples can be used. For some chemicals, specific filter and solvent information is included. Information in this field has not been extensively reviewed.

COND., used primarily to specify HPLC conditions for the purpose of grouping chemicals together for analysis. **ART**, Articles from published literature which may be prospective starting points for sampling or analysis of the chemical of interest.

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

GENERAL REFERENCES

CODE OF FEDERAL REGULATIONS (CFR) TITLE 29 PART 1910, USDOL, OSHA,

Washington, D.C. Also available U.S. Government Printing Office, Washington, D.C.

HAWLEY'S CONDENSED CHEMICAL DICTIONARY, ELEVENTH EDITION, Van Nostrand Co., New York, 1987.

IARC MONOGRAPHS ON THE EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO HUMANS. International Agency for Research on Cancer, Lyon, France. (40+ volumes). Available WHO Publications Centre USA, 49 Sheridan Ave., Albany, N.Y. 12210.

THE MERCK INDEX, TENTH EDITION, Merck & Co., Rahway, N.J., 1983. NIOSH REGISTRY OF TOXIC EFFECTS, DHHS, National Institute for Occupational Safety and Health, Cincinnati, OH. Available U.S. Government Printing Office, Washington, D.C.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, DHHS, National Institute for Occupational Safety and Health, Cincinnati, OH. September, 1985, DHHS (NIOSH) 85-114. Available U.S. Government Printing Office, Washington, D.C.

NIOSH/OSHA HEALTH GUIDELINES, DHHS, DOL, Washington, D.C., January, 1981, DHHS (NIOSH) No. 81-123. Available U.S. Government Printing Office, Washington, D.C.

FIFTH ANNUAL REPORT ON CARCINOGENS. DHHS, National Toxicology Program, Washington, D.C., NTP 89-239.

TOXIC SUBSTANCES CONTROL ACT INVENTORY, U.S. Environmental Protection Agency, Washington, D.C.

Index, Background, Identification, Exposure Levels, Carcinogen Status, Health Effects & Toxicology, Sampling & Analysis, General References

USDOL | Contact Information | Disclaimer

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TOLUENE

MSDS Number: T3913 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes:
J.T. Baker: 5375, 5584, 5809, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8091, 8092, 8604, 8605, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

---

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 3.3; uel: 19
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Aromatic benzene-like.

Solubility:
0.05 gm/100gm water @ 20C (68F).

Specific Gravity:
0.86 @ 20C / 4 C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
111C (232F)

Melting Point:
-95C (-139F)

Vapor Density (Air=1):
3.14

Vapor Pressure (mm Hg):
22 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.24

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3.2
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Toluene (108-88-3)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Toluene (108-88-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Toluene (108-88-3)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Toluene (108-88-3)	1000	U220	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF

MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **TOLUENE**

CAS Number: 108-88-3
DOT Number: UN 1294

RTK Substance number: 1866
Date: November 1992 Revision: August 1998

HAZARD SUMMARY

* **Toluene** can affect you when breathed in and by passing through your skin.
* **Toluene** should be handled as a TERATOGEN--WITH EXTREME CAUTION.
* It may damage the developing fetus.
* Contact can irritate the skin and eyes.
* Breathing **Toluene** can irritate the nose and throat causing coughing and wheezing.
* Exposure to **Toluene** can affect the nervous system causing trouble concentrating, headaches and slowed reflexes. Higher levels can cause you to feel dizzy, lightheaded, and to pass out. Death may occur.
* Prolonged contact can cause drying of the skin and a skin rash.
* Repeated **Toluene** exposure may cause liver, kidney and brain damage.
* **Toluene** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Toluene is a colorless liquid with a sweet, strong odor. It is used as a solvent, in aviation gasoline, and in making other chemicals, perfumes, medicines, dyes, explosives, and detergents.

REASON FOR CITATION

* **Toluene** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, NFPA, HHAG and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 2.9 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift, **300 ppm** not to be exceeded during any 15 minute work period and **500 ppm** as a 10 minute acceptable maximum peak.

NIOSH: The recommended airborne exposure limit is **100 ppm** averaged over a 10-hour workshift and **150 ppm** not to be exceeded during any 5 minute work period.

ACGIH: The recommended airborne exposure limit is **50 ppm** averaged over an 8-hour workshift.

* **Toluene** may be a TERATOGEN in humans. All contact with this chemical should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Toluene** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Toluene** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Toluene**:

* Contact can irritate the skin and eyes.
* Breathing **Toluene** can irritate the nose and throat causing coughing and wheezing.
* Exposure to **Toluene** can affect the nervous system causing trouble concentrating, headaches, slowed reflexes, loss of appetite and nausea. Higher levels can cause you to feel dizzy, lightheaded, and to pass out. Death may occur.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Toluene** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Toluene** has been tested and has not been shown to cause cancer in animals.

Reproductive Hazard

* **Toluene** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.
* **Toulene** may damage the developing fetus.

Other Long-Term Effects

* Prolonged contact can cause drying, cracking, itching and a skin rash.
* Repeated **Toluene** exposure may cause liver, kidney and brain damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following is recommended before beginning work and at regular times after that:

* Urinary Hippuric acid excretion test (at the end of the shift) as an index of overexposure.

If symptoms develop or overexposure is suspected, the following may be useful:

* Exam of the nervous system.
* Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Toluene** from drums or other storage containers to process containers.
* Before entering a confined space where **Toluene** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Toluene** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Toluene**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.

* On skin contact with **Toluene**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Toluene**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Toluene** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Toluene**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH and safety equipment manufacturers recommend *VITON* and *Polyvinyl Alcohol* as protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **50 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Toluene**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **500 ppm** is immediately dangerous to life and health. If the possibility of exposure above **500 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Toluene** you should be trained on its proper handling and storage.
* **Toluene** may react violently with mixtures of NITRIC and SULFURIC ACIDS.
* **Toluene** is not compatible with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
* Sources of ignition, such as smoking and open flames, are prohibited where **Toluene** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Metal containers involving the transfer of **Toluene** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Toluene**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Disease and Injury Services
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: http://www.state.nj.us/health/eoh/odisweb/

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Disease and Injury Services, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<<

Common Name: **TOLUENE**
DOT Number: **UN 1294**
NAERG Code: **130**
CAS Number: **108-88-3**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
FLAMMABLE CONTAINERS MAY EXPLODE IN FIRE POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Toluene** is a FLAMMABLE LIQUID.
* CONTAINERS MAY EXPLODE IN FIRE.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* Use dry chemical, CO_2, or foam extinguishers. Water should be used to keep containers cool.
* Vapors may travel to a source of ignition and flash back.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Toluene** is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in activated carbon absorbent and deposit in sealed containers.
* Keep **Toluene** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Toluene** as a HAZARDOUS WASTE. Contact your State Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 22 mm Hg at 68°F (20°C)
Flash Point: 40°F (4°C)
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Benzene, Methyl-
Other Names:
Phenylmethane; Toluol; Methylbenzene

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Toluene

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Toluene

SYNONYM(s): Toluol; Phenyl methane; Methyl benzene

IMIS: 2460

CAS: 108-88-3

NIOSH: RTECS XS5250000; 82955

DOT: UN1294 Flammable Liquid

DESCRIPTION:

Colorless liquid with an aromatic odor like benzene.
MW: 92
BP: 231 F
VP: 22 mm
MP: -139 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm TWA; 300 ppm Ceiling for 10 minutes; 500 ppm Peak (Table Z-2)

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 750 mg/m3 TWA

THRESHOLD LIMIT VALUE: 50 ppm, 188 mg/m3 TWA (Skin); Appendix A4 (Not Classifiable as a Human Carcinogen)

RECOMMENDED EXPOSURE LIMIT: 100 ppm TWA, 150 ppm STEL

Health Factors

SYMPTOM(s): Fatigue, weakness; confusion, euphoria, dizziness; headaches; dilated pupils, lacrimation; nervousness; muscle fatigue; insomnia; paresthesia; dermatitis

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Moderate (HE15) Narcosis (HE8)

ORGAN: CNS, liver, kidneys, skin

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 12 Liters **FLOW:** 0.05 L/min (TWA)
MAX V: 12 Liters **FLOW:** 0.05 L/min (STEL)
MIN T: >10 Minutes **FLOW:** 0.05 L/min (Ceiling)
MIN T: 1 Minute **FLOW:** 0.05 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 111)
SAE: 0.055
CLASS: Fully Validated

MEDIA: Diffusive Sampler (SKC 575-002 Passive Sampler)
SAMPLING TIME: < or 240 Minutes (TWA); >10 Minutes (Ceiling); > 10 Minutes (Peak)
ANL SOLVENT: Carbon Disulfide
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 111)
SAE: 0.095
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 122 **RANGE:** 10-600 ppm
CLASS: 3rd Party **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 23001 **RANGE:** 5-400 ppm
CLASS: 3rd Party **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 27801 **RANGE:** 25-1860 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 93074 **RANGE:** 10-800 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 803947 **RANGE:** 5-1000 ppm
CLASS: 3rd Party **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 461371 **RANGE:** 12.5-700 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 124Sa **RANGE:** 10-500 ppm
CLASS: 3rd Party **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 1.1 ppm @ 13.9 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-400 ppm @ 9.7 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 04/20/1999

NIOSH Pocket Guide to Chemical Hazards

Toluene	CAS 108-88-3
$C_6H_5CH_3$	RTECS XS5250000
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol	**DOT ID & Guide** 1294 130

Exposure Limits	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
	OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
IDLH 500 ppm See: 108883	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1500, Hydrocarbons] [Also #4000, #1501] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact	Eye: Irrigate immediately
Eyes: Prevent eye contact	Skin: Soap wash promptly
Wash skin: When contaminated	Breathing: Respiratory support
Remove: When wet (flammable)	Swallow: Medical attention immediately
Change: N.R.	

Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache;

dilated pupils, lacrimation (discharge of tears); nervousness, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage
Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys
See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

XYLENES

MSDS Number: X2000 --- *Effective Date: 09/08/97*

1. Product Identification

Synonyms: Dimethyl benzene, xylol, methyltoluene
CAS No.: 1330-20-7
Molecular Weight: 106.17
Chemical Formula: C6H4(CH3)2
Product Codes:
J.T. Baker: 5377, 5810, 5813, 9483, 9489, 9490, 9493, 9494, 9499, 9516, X516
Mallinckrodt: 8664, 8668, 8671, 8672, 8685, 8802

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Xylene	108-38-3	40 - 65%	No
o-Xylene	95-47-6	15 - 20%	No
p-Xylene	106-42-3	< 20%	No
Ethyl Benzene	100-41-4	15 - 25%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors may be irritating to the nose and throat. Inhalation of high concentrations may result in nausea, vomiting, headache, ringing in the ears, and severe breathing difficulties which may be delayed in onset. Substernal pain, cough, and hoarseness are also reported. High vapor concentrations are anesthetic and central nervous system depressants.
Ingestion:
Ingestion causes burning sensation in mouth and stomach, nausea, vomiting and salivation. Minute amounts aspirated into the lungs can produce a severe hemorrhagic pneumonitis with severe pulmonary injury or death.
Skin Contact:
Skin contact results in loss of natural oils and often results in a characteristic dermatitis. May be absorbed through the skin.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, blood, or respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 29C (84F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:
lel: 1.0; uel: 7.0
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors,

liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) xylene
100 ppm (TWA) ethylbenzene
-ACGIH Threshold Limit Value (TLV):
100 ppm (TWA) 150 ppm (STEL) xylene
Carcinogen Category (xylene): A4
100 ppm (TWA) 125 ppm (STEL) ethyl benzene
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details. Use explosion-proof equipment.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

The following physical data is for xylene.
Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Insoluble in water.
Specific Gravity:
0.86 @ 20C/4C
pH:
Not applicable.

% Volatiles by volume @ 21C (70F):
100
Boiling Point:
137 - 140C (279 - 284F)
Melting Point:
-25C (-13F)
Vapor Density (Air=1):
3.7
Vapor Pressure (mm Hg):
8 @ 20C (68F)
Evaporation Rate (BuAc=1):
0.7

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Involvement in a fire causes formation of carbon monoxide and unidentified organic components.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents and strong acids.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Xylene: oral rat LD50: 4300 mg/kg; inhalation rat LC50: 5000 ppm/4H; skin rabbit LD50: > 1700 mg/kg; Irritation eye rabbit: 87 mg mild (Std. Draize); irritation skin rabbit 500 mg/24 moderate (Std. Draize); investigated as a tumorigen, mutagen, reproductive effector.
Ethyl benzene: oral rat LD50: 3500 mg/kg; skin rabbit LD50: 17800 uL/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
May cause teratogenic effects.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
m-Xylene (108-38-3)	No	No	3
o-Xylene (95-47-6)	No	No	3
p-Xylene (106-42-3)	No	No	3
Ethyl Benzene (100-41-4)	No	No	None

12. Ecological Information

Environmental Fate:

Following data for xylene: When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. (mixed xylenes: octanol / water partition coefficient 3.1 - 3.2; bioconcentration factor = 1.3, eels)
Environmental Toxicity:
For xylene: This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

International (Water, I.M.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3.3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
m-Xylene (108-38-3)	Yes	Yes	Yes	Yes
o-Xylene (95-47-6)	Yes	Yes	Yes	Yes
p-Xylene (106-42-3)	Yes	Yes	Yes	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
m-Xylene (108-38-3)	Yes	Yes	No	Yes
o-Xylene (95-47-6)	Yes	Yes	No	Yes
p-Xylene (106-42-3)	Yes	Yes	No	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
m-Xylene (108-38-3)	No	No	Yes	No
o-Xylene (95-47-6)	No	No	Yes	No
p-Xylene (106-42-3)	No	No	Yes	No
Ethyl Benzene (100-41-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
m-Xylene (108-38-3)	1000	No	No
o-Xylene (95-47-6)	1000	No	No
p-Xylene (106-42-3)	100	No	Yes
Ethyl Benzene (100-41-4)	1000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 3[Y]
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.
Label Precautions:
Keep away from heat, sparks and flame.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT

INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

Disclaimer:

****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **XYLENES**

CAS Number: 1330-20-7
DOT Number: UN 1307

RTK Substance number: 2014
Date: March 1992 Revision: May 1998

HAZARD SUMMARY

* **Xylenes** can affect you when breathed in and by passing through your skin.
* **Xylenes** may damage the developing fetus.
* Exposure can irritate the skin and eyes.
* Breathing **Xylenes** can irritate the nose and throat.
* **Xylenes** can cause headache, nausea, and vomiting. High levels can cause dizziness, lightheadedness, passing out and even death.
* Prolonged contact with **Xylenes** can cause dryness and cracking of the skin.
* Repeated exposure to **Xylenes** can cause poor memory and concentration.
* **Xylenes** can damage the liver and kidneys.
* **Xylenes** are FLAMMABLE LIQUIDS and FIRE HAZARDS.

IDENTIFICATION

Xylenes are similar chemicals which form a clear liquid with a strong odor. They are used as solvents, in making drugs, dyes, insecticides, lacquers and enamels, and in gasoline for airplanes.

REASON FOR CITATION

* **Xylenes** are on the Hazardous Substance List because they are regulated by OSHA and cited by ACGIH, DOT, HHAG, NIOSH, NFPA, DEP and EPA.
* These chemicals are on the Special Health Hazard Substance List because they are **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.081 to 40 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

The following exposure limits are for all isomers of **Xylenes**.

OSHA: The legal airborne permissible exposure limit (PEL) is **100 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **100 ppm** averaged over a 10-hour workshift and **150 ppm** not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **100 ppm** averaged over an 8-hour workshift and **150 ppm** as a STEL (short-term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Xylenes** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Xylenes** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Xylenes**:

* Exposure can irritate the skin and eyes.
* Breathing **Xylenes** can irritate the nose and throat causing cough and difficulty in breathing.
* **Xylenes** can cause headache, nausea and vomiting, tiredness and stomach upset. High levels can cause dizziness, lightheadedness, fatigue, confusion, passing out and even death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Xylenes** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Xylenes** have been tested and have not been shown to cause cancer in animals.

Reproductive Hazard

* **Xylenes** may damage the developing fetus.

Other Long-Term Effects

* Prolonged contact with **Xylenes** can cause dryness and cracking of the skin.
* Repeated exposure to **Xylenes** can cause poor memory, difficulty in concentration, and other brain effects. It can also cause damage to the surface of the eye.
* **Xylenes** can damage the liver and kidneys.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following is recommended before beginning work and at regular times after that:

* Exam of the eyes.

If symptoms develop or overexposure is suspected, the following may be useful:

* Liver and kidney function tests.
* Urine concentration of *m-Methylhippuric Acid* (at the end of the workshift) as an index of overexposure.
* Exam of the nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by **Xylenes**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Xylenes** from drums or other storage containers to process containers.
* Before entering a confined space where **Xylenes** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Xylenes** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Xylenes**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Xylenes**, immediately wash or shower to remove the chemicals. At the end of the workshift, wash any areas of the body that may have contacted **Xylenes**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Xylenes** are handled, processed, or stored, since the chemicals can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Xylenes**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends the use of *Polyvinyl Alcohol* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **100 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Xylenes**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **900 ppm** is immediately dangerous to life and health. If the possibility of exposure above **900 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Xylenes** you should be trained on their proper handling and storage.
* **Xylenes** are not compatible with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
* Sources of ignition, such as smoking and open flames, are prohibited where **Xylenes** are used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Xylenes**.
* Protect storage containers from physical damage.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<<

Common Name: **XYLENES**
DOT Number: **UN 1307**
NAERG Code: **130**
CAS Number: **1330-20-7**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE FLAMMABLE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Xylenes** are FLAMMABLE LIQUIDS.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Vapors may travel to a source of ignition and flash back.
* Use dry chemical, CO_2, or foam extinguishers.
* Water spray may be used to reduce vapors.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Xylenes** are spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Xylenes** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Xylenes** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 7 to 9 mm Hg at 68°F (20°C)
Flash Point: 81 to 90°F (27° to 32°C)
Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Dimethylbenzenes

Xylenes is the common name for any combination of the following isomers:

1,2-Dimethylbenzene (ortho-Xylene),
CAS #95-47-6 RTK Sub. No. 2903
1,3-Dimethylbenzene (meta-Xylene),
CAS #108-38-3 RTK Sub. No. 2902
1,4-Dimethylbenzene (para-Xylene),
CAS #106-42-3 RTK Sub. No. 2904

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Xylene

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Xylene

SYNONYM(s): o-, m-, and p-Isomers; Xylol; Dimethylbenzene

IMIS: 2590

CAS: 1330-20-7

NIOSH: RTECS ZE2100000; 88404

DOT: UN1307 Flammable Liquid

DESCRIPTION:

Colorless liquid with aromatic odors (pure p-xylene is a solid at <55 F)
MW: 106
BP: 292/282/281 F
VP: 7/9/9
MP: -12/-54/55 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 100 ppm, 435 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 100 ppm, 435 mg/m3 TWA

THRESHOLD LIMIT VALUE: 100 ppm, 434 mg/m3 TWA; 150 ppm, 651 mg/m3 STEL; Appendix A4 (Not Classifiable as a Human Carcinogen) (o, m & p isomers)

RECOMMENDED EXPOSURE LIMIT: 100 ppm TWA, 150 ppm STEL

Health Factors

SYMPTOM(s): Dizziness, excitement, drowsiness, incoordination, staggering gait; eye, nose, throat irritation; corneal vacuolization; anorexia; nausea, vomiting, abdominal pain; dermatitis

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Moderate (HE15) Narcosis (HE8)

ORGAN: CNS, eyes, GI tract, blood, liver, kidneys, skin

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 23 Liters **MAX F:** 0.2 L/min (TWA)
MAX V: 3 Liters **MAX F:** 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 1501)
SAE: 0.11
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Draeger
PART #: CH 27801 **RANGE:** 25-1860 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: 67 33161 **RANGE:** 10-400 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 463201 **RANGE:** 10-500 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Sensidyne
PART #: 123 **RANGE:** 10-500 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 143S **RANGE:** 5-1000 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 1.9 ppm @ 13.1 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-200 ppm @ 12.6 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 01/19/1999

NIOSH Pocket Guide to Chemical Hazards

o-Xylene	**CAS** 95-47-6
$C_6H_4(CH_3)_2$	**RTECS** ZE2450000
Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1501, Aromatic Hydrocarbons] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract,

blood, liver, kidneys
See also: INTRODUCTION See ICSC CARD: 0084

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ETHYL KETONE

MSDS Number: M4628 --- *Effective Date: 02/16/98*

1. Product Identification

Synonyms: 2-Butanone; ethyl methyl ketone; MEK; Methyl acetone
CAS No.: 78-93-3
Molecular Weight: 72.11
Chemical Formula: CH3COCH2CH3
Product Codes:
J.T. Baker: 5385, 5808, 9214, 9319, 9323, Q531
Mallinckrodt: 6206, 6233, 6235, 6240, 6243

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Ethyl Ketone	78-93-3	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the nose and throat. Concentrations above the TLV may cause headache, dizziness, nausea, shortness of breath, and vomiting. Higher concentrations may cause central nervous system depression and unconsciousness.
Ingestion:
May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors are irritating to the eyes. Splashes can produce painful irritation and eye damage.
Chronic Exposure:
Prolonged skin contact may defat the skin and produce dermatitis. Chronic exposure may cause central nervous system effects.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

---

5. Fire Fighting Measures

Fire:
Flash point: -9C (16F) CC

Autoignition temperature: 404C (759F)
Flammable limits in air % by volume:
lel: 1.4; uel: 11.4
Extremely Flammable.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 300 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details. Use explosion-proof equipment.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Butyl rubber is a suitable material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Sharp mint-like odor.
Solubility:
29 g in 100 g of water.
Specific Gravity:
0.81 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
80C (176F)
Melting Point:
-86C (-123F)
Vapor Density (Air=1):
2.5
Vapor Pressure (mm Hg):
78 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.7 (Ether = 1)

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing materials, caustics, amines, ammonia, strong bases, chloroform, chlorosulfonic acid, oleum, potassium-t-butoxide, heat or flame, hydrogen peroxide, nitric acid. Can attack many plastics, resins and rubber.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2737 mg/kg; inhalation rat LC50: 23,500 mg/m3/8-hr; skin rabbit LD50: 6480 mg/kg; investigated as a mutagen, reproductive effector.
Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Ethyl Ketone (78-93-3)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material is expected to have a half-life between 10 and 30 days. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste

facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3
UN/NA: UN1193
Packing Group: II
Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: ETHYL METHYL KETONE
Hazard Class: 3.2
UN/NA: UN1193
Packing Group: II
Information reported for product/size: 215L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Methyl Ethyl Ketone (78-93-3)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Ethyl Ketone (78-93-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Ethyl Ketone (78-93-3)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Ethyl Ketone (78-93-3)	5000	U159	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E

Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 14.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **METHYL ETHYL KETONE**

CAS Number: 78-93-3
DOT Number: UN 1193

RTK Substance number: 1258
Date: February 1989 Revision: September 1996

HAZARD SUMMARY

* **Methyl Ethyl Ketone** can affect you when breathed in and by passing through your skin.
* **Methyl Ethyl Ketone** can irritate the skin causing a rash and burning feeling on contact. Repeated exposure can cause drying and cracking of the skin.
* Contact can severely irritate and burn the eyes, leading to permanent damage.
* Exposure to the vapor can irritate the eyes, nose, mouth, and throat causing coughing and wheezing.
* Exposure can cause dizziness, lightheadedness, headache, nausea, blurred vision, and may cause you to pass out.
* Repeated exposure can damage the nervous system and may affect the brain.
* **Methyl Ethyl Ketone** is a FLAMMABLE LIQUID.

IDENTIFICATION

Methyl Ethyl Ketone is a colorless liquid with a fragrant, mint-like odor. It is used as a solvent and in making plastics, textiles, and paints.

REASON FOR CITATION

* **Methyl Ethyl Ketone** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DEP, DOT, NIOSH, NFPA, HHAG and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 5.4 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **200 ppm** averaged over a 10-hour workshift and **300 ppm** not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **200 ppm** averaged over an 8-hour workshift and **300 ppm** as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Methyl Ethyl Ketone** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Methyl Ethyl Ketone** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methyl Ethyl Ketone**:

* **Methyl Ethyl Ketone** can irritate the skin causing a rash and burning feeling on contact.
* Contact can severely irritate and burn the eyes, leading to permanent damage.
* Exposure to the vapor can irritate the eyes, nose, mouth, and throat causing coughing and wheezing.
* Exposure can cause dizziness, lightheadedness, headache, nausea, blurred vision, and may cause you to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methyl Ethyl Ketone** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methyl Ethyl Ketone** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* There is limited evidence that **Methyl Ethyl Ketone** is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.

Other Long-Term Effects

* Repeated exposure can damage the nervous system and may affect the brain. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").
* Repeated exposure can cause drying and cracking of the skin.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* Interview for brain effects, including recent memory, mood (irritability, withdrawal), concentration, headaches, malaise and altered sleep patterns. Consider cerebellar, autonomic and peripheral nervous system evaluation. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Methyl Ethyl Ketone in combination with *Methyl Butyl Ketone* and possibly other solvents can damage the nervous system.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Methyl Ethyl Ketone** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Ketones #78-173.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methyl Ethyl Ketone** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methyl Ethyl Ketone**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Methyl Ethyl Ketone**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Methyl Ethyl Ketone**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Methyl Ethyl Ketone** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methyl Ethyl Ketone**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends the use of *Butyl Rubber* materials in protective clothing.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **200 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Methyl Ethyl Ketone**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **3,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **3,000 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Methyl Ethyl Ketone** you should be trained on its proper handling and storage.
* **Methyl Ethyl Ketone** must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE) since violent reactions occur.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT, SPARKS or FLAME.

* Sources of ignition, such as smoking and open flames, are prohibited where **Methyl Ethyl Ketone** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Metal containers involving the transfer of **Methyl Ethyl Ketone** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Ethyl Ketone**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?.
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?
A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>EMERGENCY INFORMATION<<<<<<<<<<<<<<<<<

Common Name: **METHYL ETHYL KETONE**
DOT Number: **UN 1193**
NAERG Code: **127**
CAS Number: **78-93-3**

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Methyl Ethyl Ketone** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers. Water should be used to keep fire-exposed containers cool.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* Vapors may travel to a source of ignition and flash back.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methyl Ethyl Ketone** is spilled or leaked, take the following steps:

* Evacuate and isolate the area of the spill or leak, and restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Methyl Ethyl Ketone** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Methyl Ethyl Ketone** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 70.6 mm Hg at 68°F (20°C)
Flash Point: 21°F (-6.1°C)
Water Solubility: Soluble

OTHER COMMONLY USED NAMES

Chemical Name:
2-Butanone
Other Names:
MEK; Ethyl Methyl Ketone; Butanone

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
2-Butanone

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2-Butanone

SYNONYM(s): Methyl Ethyl Ketone; MEK; Ethyl Methyl Ketone; Methylethylketone; Composite Constituent

IMIS: 0430

CAS: 78-93-3

NIOSH: RTECS EL6475000; 21754

DOT: UN1193 Flammable Liquid

DESCRIPTION:

Clear, colorless liquid with a fragrant, mint-like moderately sharp odor.
MW: 72
BP: 175 F
VP: 70 mm
MP: -123 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 590 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 590 mg/m3 TWA

THRESHOLD LIMIT VALUE: 200 ppm, 590 mg/m3 TWA; 300 ppm, 885 mg/m3 STEL (TLV listed for MEK)

RECOMMENDED EXPOSURE LIMIT: 200 ppm TWA, 300 ppm STEL

Health Factors

SYMPTOM(s): Eye, nose irritation; headaches, dizziness; vomiting

HEALTH EFFECTS: Irritation-Eye, Nose, Throat---Moderate (HE15); Narcosis (HE8)

ORGAN: CNS, lungs

Monitoring

SLC1:

MEDIA: Two Silica Gel Tubes in series (150/75mg sections, 20/40 mesh)
ANL SOLVENT: Dimethyl Sulfoxide
MAX V: 3 Liters **MAX F:** 0.1 L/min (TWA)
MAX V: 1.5 Liters **MAX F:** 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 16)
SAE: 0.11
CLASS: Fully Validated

MEDIA: Carbosieve S-III Tube (130/65 mg sections; 60/80 mesh)
ANL SOLVENT: Carbon Disulfide : Dimethyl Formamide (99:1)
MAX V: 3 Liters **MAX F:** 0.05 L/min (TWA)
MAX V: 0.75 Liters **MAX F:** 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 84)
SAE: 0.12
CLASS: Fully Validated

MEDIA: Anasorb 747 (150/75 mg sections; 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 12 Liters **MAX F:** 0.20 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 2500)
SAE: 0.10
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 152 **RANGE:** 0.02-0.6%
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 139U **RANGE:** 20-1500 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.4 ppm @ 8.8 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-400 ppm @ 8.5 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 11/17/1998

NIOSH Pocket Guide to Chemical Hazards

2-Butanone	**CAS** 78-93-3
$CH_3COCH_2CH_3$	**RTECS** EL6475000
Synonyms & Trade Names Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone	**DOT ID & Guide** 1193 127 1232 127

Exposure Limits	NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3)
	OSHA PEL†: TWA 200 ppm (590 mg/m^3)
IDLH 3000 ppm See: 78933	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.

MW: 72.1	BP: 175°F	FRZ: -123°F	Sol: 28%
VP: 78 mmHg	IP: 9.54 eV		Sp.Gr: 0.81
Fl.P: 16°F	UEL(200°F): 11.4%	LEL(200°F): 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, amines, ammonia, inorganic acids, caustics, isocyanates, pyridines

Measurement Method
Carbon beads; CS_2; Gas chromatography/Flame ionization detection; IV [#2500] See: NMAM INDEX

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: N.R.
Provide: Eyewash

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water wash immediately
Breathing: Fresh air
Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 3000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0179 See MEDICAL TESTS: 0133

OSHA Chemical Sampling Information
2-Butanone

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2-Butanone

SYNONYM(s): Methyl Ethyl Ketone; MEK; Ethyl Methyl Ketone; Methylethylketone; Composite Constituent

IMIS: 0430

CAS: 78-93-3

NIOSH: RTECS EL6475000; 21754

DOT: UN1193 Flammable Liquid

DESCRIPTION:

Clear, colorless liquid with a fragrant, mint-like moderately sharp odor.
MW: 72
BP: 175 F
VP: 70 mm
MP: -123 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 590 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 590 mg/m3 TWA

THRESHOLD LIMIT VALUE: 200 ppm, 590 mg/m3 TWA; 300 ppm, 885 mg/m3 STEL (TLV listed for MEK)

RECOMMENDED EXPOSURE LIMIT: 200 ppm TWA, 300 ppm STEL

Health Factors

SYMPTOM(s): Eye, nose irritation; headaches, dizziness; vomiting

HEALTH EFFECTS: Irritation-Eye, Nose, Throat---Moderate (HE15); Narcosis (HE8)

ORGAN: CNS, lungs

Monitoring

SLC1:

MEDIA: Two Silica Gel Tubes in series (150/75mg sections, 20/40 mesh)
ANL SOLVENT: Dimethyl Sulfoxide
MAX V: 3 Liters **MAX F:** 0.1 L/min (TWA)
MAX V: 1.5 Liters **MAX F:** 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 16)
SAE: 0.11
CLASS: Fully Validated

MEDIA: Carbosieve S-III Tube (130/65 mg sections; 60/80 mesh)
ANL SOLVENT: Carbon Disulfide : Dimethyl Formamide (99:1)
MAX V: 3 Liters **MAX F:** 0.05 L/min (TWA)
MAX V: 0.75 Liters **MAX F:** 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 84)
SAE: 0.12
CLASS: Fully Validated

MEDIA: Anasorb 747 (150/75 mg sections; 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 12 Liters **MAX F:** 0.20 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 2500)
SAE: 0.10
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 152 **RANGE:** 0.02-0.6%
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 139U **RANGE:** 20-1500 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.4 ppm @ 8.8 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-400 ppm @ 8.5 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 11/17/1998

NIOSH Pocket Guide to Chemical Hazards

2-Butanone	CAS 78-93-3
$CH_3COCH_2CH_3$	RTECS EL6475000
Synonyms & Trade Names Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone	**DOT ID & Guide** 1193 127 1232 127

Exposure Limits	NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3)
	OSHA PEL†: TWA 200 ppm (590 mg/m^3)
IDLH 3000 ppm See: 78933	**Conversion** 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.

MW: 72.1	BP: 175°F	FRZ: -123°F	Sol: 28%
VP: 78 mmHg	IP: 9.54 eV		Sp.Gr: 0.81
Fl.P: 16°F	UEL(200°F): 11.4%	LEL(200°F): 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, amines, ammonia, inorganic acids, caustics, isocyanates, pyridines

Measurement Method
Carbon beads; CS_2; Gas chromatography/Flame ionization detection; IV [#2500] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R. Provide: Eyewash	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 3000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0179 See MEDICAL TESTS: 0133

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

STODDARD SOLVENT

MSDS Number: S6588 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: White spirits; Mineral spirits type I; Petroleum distillate
CAS No.: 8052-41-3
Molecular Weight: Not applicable to mixtures.
Chemical Formula: > 65% C10 or higher hydrocarbons
Product Codes: V110

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Stoddard Solvent	8052-41-3	98 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. AFFECTS CENTRAL NERVOUS SYSTEM. MAY AFFECT KIDNEYS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 2 - Moderate

Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Effects are typically those of most hydrocarbons, dizziness and euphoria leading to unconsciousness in severe cases. Vapors also irritate the respiratory tract. Symptoms may include coughing, difficult breathing and chest pain. A central nervous system depressant.

Ingestion:
Fatal dose for humans estimated at 3-4 oz, but ingestion of much smaller amounts may cause lung edema and possible death because of aspiration into lungs.

Skin Contact:
The defatting action of this solvent may lead to soreness, inflammation and, possibly, dermatitis.

Eye Contact:
Vapors may be irritating at concentrations of 450 ppm and above (15 minutes exposure) and contact with the liquid solvent can be painful and possibly damaging to eye tissues.

Chronic Exposure:
Chronic exposure may lead to central nervous system complications, blood changes (aplastic anemia, a rare occurrence that is potentially fatal), and dermatitis. Animal studies have indicated the potential for liver and kidney damage.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired kidney function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 38C (100F) CC Autoignition temperature: 232 - 260C (450 - 500F) Flammable limits in air % by volume: lel: 0.8; uel: ca. 6 Flammable. This liquid is near its lower flammability limit at room temperature. Flash point may range between 38-40 C. Contact with strong oxidizers may cause fire.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Direct stream of water can scatter and spread flames.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 500 ppm (TWA) -ACGIH Threshold Limit Value (TLV): 100 ppm (TWA)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Kerosene-like.

Solubility:
Insoluble in water.

Density:
0.79

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
156 - 202C (313 - 396F)

Melting Point:
No information found.

Vapor Density (Air=1):
4.8

Vapor Pressure (mm Hg):
ca. 5 @ 25C (77F)

Evaporation Rate (BuAc=1):
ca. 0.08

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong acids, strong oxidizers.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.
Investigated as a tumorigen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Stoddard Solvent (8052-41-3)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. (STODDARD SOLVENT)
Hazard Class: 3
UN/NA: UN1268
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: PETROLEUM DISTILLATES, N.O.S. (STODDARD SOLVENT)
Hazard Class: 3.3
UN/NA: UN1268
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Stoddard Solvent (8052-41-3)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Stoddard Solvent (8052-41-3)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Stoddard Solvent (8052-41-3)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Stoddard Solvent (8052-41-3)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 3[Y]E
Poison Schedule: S5

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 3 **Flammability:** 2 **Reactivity:** 0

Label Hazard Warning:
DANGER! HARMFUL OR FATAL IF SWALLOWED. AFFECTS CENTRAL NERVOUS SYSTEM. MAY AFFECT KIDNEYS. FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:
Keep away from heat, sparks and flame. Avoid breathing vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Avoid contact with eyes, skin and clothing.

Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its

appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **STODDARD SOLVENT**

CAS Number: 8052-41-3
DOT Number: UN 1268 (Petroleum Distillates)

RTK Substance number: 1736
Date: June 1992 Revision: August 1998

HAZARD SUMMARY

* **Stoddard Solvent** can affect you when breathed in.
* Exposure can irritate the skin, eyes, nose, and throat.
* **Stoddard Solvent** can cause dizziness, lightheadedness and passing out.
* Repeated exposure may cause a rare reaction in some people that destroys blood cells (*aplastic anemia*). This can be fatal.
* Prolonged contact can cause drying and cracking of the skin, severe irritation and skin ulcers.
* There are other names used for **Stoddard Solvent**. This fact sheet covers *Spotting Naphtha, Dry Cleaner Naphtha, Mineral Spirits* and *Petroleum Solvent*.

IDENTIFICATION

Stoddard Solvent is a colorless liquid with a kerosene-like odor. It is used to "thin" paints, in coatings, waxes and ink, for dry cleaning, degreasing, and cleaning in mechanical shops, and as a herbicide.

REASON FOR CITATION

* **Stoddard Solvent** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NIOSH, and DOT.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 1 to 30 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **2900 mg/m^3** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **350 mg/m^3** averaged over a 10-hour workshift and **1,800 mg/m^3** not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **525 mg/m^3** averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Stoddard Solvent**.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Stoddard Solvent** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Stoddard Solvent**:

* Exposure can irritate the skin, eyes, nose, and throat.
* **Stoddard Solvent** can cause dizziness, lightheadedness and passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Stoddard Solvent** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Stoddard Solvent** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Stoddard Solvent** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* Repeated exposure may cause a rare reaction in some people that destroys blood cells (*aplastic anemia*). This can be fatal.
* Prolonged contact can cause drying and cracking of the skin, severe irritation and skin ulcers.
* This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* Complete blood count.
* Evaluate for brain effects such as changes in memory, concentration, sleeping patterns and mood (especially irritability and social withdrawal), as well as headaches and fatigue. Consider evaluations of the cerebellar, autonomic and peripheral nervous systems. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **Stoddard Solvent** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Stoddard Solvent** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Stoddard Solvent.**
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Stoddard Solvent**, immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where **Stoddard Solvent** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Stoddard Solvent**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Nitrile* or *Polyvinyl Alcohol* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **350 mg/m^3**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Stoddard Solvent**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **20,000 mg/m^3** is immediately dangerous to life and health. If the possibility of exposure above **20,000 mg/m^3** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Disease and Injury Services
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: http://www.state.nj.us/health/eoh/odisweb/

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Disease and Injury Services, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **STODDARD SOLVENT**
DOT Number: **UN 1268 (Petroleum Distillates)**
NAERG Code: **128**
CAS Number: **8052-41-3**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	2	-
REACTIVITY	0	-
COMBUSTIBLE POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Stoddard Solvent** is a COMBUSTIBLE LIQUID.
* Use dry chemical, CO_2, or foam extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* Cool fire exposed containers with water.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Stoddard Solvent** is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of **Stoddard Solvent** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE

* Prior to working with **Stoddard Solvent** you should be trained on its proper handling and storage.
* **Stoddard Solvent** is not compatible with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT.
* **Stoddard Solvent** attacks some forms of plastics, rubber and coatings.
* Sources of ignition, such as smoking and open flames, are prohibited where **Stoddard Solvent** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 2 mm Hg at 68°F (20°C)
Flash Point: 102°F (39°C) to 140°F (60°C)
Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:

Stoddard Solvent

Other Names:

Spotting Naphtha; Dry Cleaner Naphtha; Mineral Spirits; Petroleum Solvent

---

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Stoddard Solvent

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Stoddard Solvent

SYNONYM(s): Dry cleaning safety solvent; Mineral spirits

IMIS: 2270

CAS: 8052-41-3

NIOSH: RTECS WJ8925000; 78819

DESCRIPTION:

Colorless liquid with a kerosene-like odor.
MW: approx. 144
BP: 302 to 392 F
VP: approx. 2 mm

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 500 ppm, 2900 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 1150 mg/m3 TWA

THRESHOLD LIMIT VALUE: 100 ppm, 525 mg/m3 TWA

RECOMMENDED EXPOSURE LIMIT: 350 mg/m3 TWA, 1800 mg/m3 Ceiling (15 min)

Health Factors

SYMPTOM(s): Eye, nose, throat irritation; dizziness; dermatitis

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)

ORGAN: Skin, eyes, respiratory system, CNS

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 15 Liters **MAX F:** 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 48)
SAE: 0.16
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 128 **RANGE:** 100-8000 mg/m3
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.1 ppm @ 3.4 um
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 06/13/1994

NIOSH Pocket Guide to Chemical Hazards

Stoddard solvent	CAS 8052-41-3
	RTECS WJ8925000
Synonyms & Trade Names Dry cleaning safety solvent, Mineral spirits, Petroleum solvent, Spotting naphtha [Note: A refined petroleum solvent with a flash point of 102-110°F, boiling point of 309-396°F, and containingg >65% C10 or higher hydrocarbons.]	**DOT ID & Guide** 1268 128 (petroleum distillate)

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: TWA 500 ppm (2900 mg/m^3)
IDLH 20,000 mg/m^3 See: 8052413	**Conversion**

Physical Description
Colorless liquid with a kerosene-like odor.

MW: Varies	BP: 309-396°F	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.78
Fl.P: 102-110°F	UEL: ?	LEL: ?	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1550, Naphthas] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 3500 mg/m^3: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 10) Any supplied-air respirator*

Up to 8750 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

Up to 17,500 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 20,000 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000)

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms irritation eyes, nose, throat; dizziness; dermatitis; chemical pneumonia (aspiration liquid); in animals: kidney damage
Target Organs Eyes, skin, respiratory system, central nervous system, kidneys
See also: INTRODUCTION See ICSC CARD: 0361 See MEDICAL TESTS: 0212

NIOSH Pocket Guide to Chemical Hazards

Petroleum distillates (naphtha)	**CAS** 8002-05-9
	RTECS SE7449000
Synonyms & Trade Names Aliphatic petroleum naphtha, Petroleum naphtha, Rubber solvent	**DOT ID & Guide** 1255 128

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: TWA 500 ppm (2000 mg/m^3)
IDLH 1100 ppm [10%LEL] See: 8002059	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless liquid with a gasoline- or kerosene-like odor. [Note: A mixture of paraffins (C5 to C13) that may contain a small amount of aromatic hydrocarbons.]

MW: 99 (approx)	BP: 86-460°F	FRZ: -99°F	Sol: Insoluble
VP: 40 mmHg (approx)	IP: ?		Sp.Gr: 0.63-0.66
Fl.P: -40 to -86°F	UEL: 5.9%	LEL: 1.1%	

Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1550, Naphthas] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 850 ppm: (APF = 10) Any supplied-air respirator
Up to 1100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose, throat; dizziness, drowsiness, headache, nausea; dry cracked skin; chemical pneumonia (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION

International Chemical Safety Cards

ETHANOL (ANHYDROUS)

ICSC: 0044

ETHANOL (ANHYDROUS)
Ethyl alcohol
CH_3CH_2OH/C_2H_6OH
Molecular mass: 46.1

CAS # 64-17-5
RTECS # KQ6300000
ICSC # 0044
UN # 1170
EC # 603-002-00-5

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking. NO contact with strong oxidants.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• **INHALATION**	Cough. Drowsiness. Headache. Fatigue.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest.
• **SKIN**	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**	Redness. Pain. Burning.	Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**	Burning sensation. Confusion. Dizziness. Headache. Unconsciousness.	Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Wash away remainder with plenty of water.	Fireproof. Separated from strong oxidants.	F symbol R: 11 S: (2-)7-16 UN Hazard Class: 3

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0044

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

ETHANOL (ANHYDROUS)

ICSC: 0044

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** Reacts slowly with calcium hypochlorite, silver oxide and ammonia, causing fire and explosion hazard. Reacts violently with strong oxidants such as nitric acid, silver nitrate, mercuric nitrate or magnesium perchlorate, causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: 1000 ppm; 1880 mg/m^3 (as TWA) (ACGIH 1993-1994). MAK: 1000 ppm; 1900 mg/m^3; IV (1992). MAK: class D (1992).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the eyes. Inhalation of high concentration of vapour may cause irritation of the eyes and respiratory tract. The substance may cause effects on the central nervous system. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the upper respiratory tract and central nervous system , resulting in irritation, headache, fatigue and lack of concentration. Chronic ingestion of ethanol may cause liver cirrhosis.
PHYSICAL PROPERTIES	Boiling point: 79°C Melting point: -117°C Relative density (water = 1): 0.8 Solubility in water: miscible Vapour pressure, kPa at 20°C: 5.8 Relative vapour density (air = 1): 1.6	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.03 Flash point: 13°C c.c. Auto-ignition temperature: 363°C Explosive limits, vol% in air: 3.3-19 Octanol/water partition coefficient as log Pow: -0.32
ENVIRONMENTAL DATA		

NOTES

Ethanol consumption during pregnancy may adversely affect the unborn child.

Transport Emergency Card: TEC (R)-32
NFPA Code: H 0; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0044 **ETHANOL (ANHYDROUS)**

© IPCS, CEC, 1993

IMPORTANT LEGAL NOTICE: Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ETHYL ALCOHOL**

CAS Number: 64-17-5
DOT Number: UN 1170

RTK Substance number: 0844
Date: July 1990 Revision: January 1996

HAZARD SUMMARY

* **Ethyl Alcohol** can affect you when breathed in and by passing through your skin.
* **Ethyl Alcohol** may cause mutations. Handle with extreme caution.
* High concentrations may damage the fetus.
* **Ethyl Alcohol** can irritate the skin. Repeated contact can dry the skin, with cracking, peeling and itching.
* Exposure can cause headache, nausea, a feeling of heat, and drowsiness. Higher exposure can cause unconsciousness.
* Exposure can irritate the eyes, nose, mouth and throat.
* Breathing **Ethyl Alcohol** can irritate the lungs causing coughing and/or shortness of breath.
* Repeated high exposure may damage the liver and affect the nervous system.
* **Ethyl Alcohol** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Ethyl Alcohol is a clear, colorless liquid with a strong odor and bitter taste. It is used as a solvent and is present in alcoholic beverages.

REASON FOR CITATION

* **Ethyl Alcohol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NFPA and NIOSH.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 84 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **1000 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **1000 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **1000 ppm** averaged over an 8-hour workshift.

* **Ethyl Alcohol** may cause mutations. All contact with this chemical should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Ethyl Alcohol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Ethyl Alcohol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Ethyl Alcohol**:

* **Ethyl Alcohol** can irritate the skin.
* Breathing **Ethyl Alcohol** can irritate the lungs causing coughing and/or shortness of breath.
* Exposure can irritate the eyes, nose, mouth and throat.
* Exposure can cause headache, nausea, a feeling of heat, and drowsiness. Higher exposure can cause unconsciousness.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Ethyl Alcohol** and can last for months or years:

Cancer Hazard

* **Ethyl Alcohol** may cause mutations (genetic changes).

Reproductive Hazard

* **Ethyl Alcohol** is the same substance that is in alcoholic beverages. Repeated exposure to **Ethyl Alcohol** (including alcoholic beverages) may cause spontaneous abortions, as well as birth defects and other developmental problems. This condition is referred to as "fetal alcohol syndrome."

Other Long-Term Effects

* Repeated high exposure may damage the liver and affect the nervous system.
* Repeated contact can dry the skin, with cracking, peeling and itching.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following are recommended before beginning work and at regular times after that:

* Liver function tests.
* Analysis of blood, urine and exhaled breath for **Ethyl Alcohol**.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because **Ethyl Alcohol** is in beer, wine, liquor, etc., more than light consumption of these drinks can increase exposure.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **Ethyl Alcohol** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Ethyl Alcohol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Ethyl Alcohol**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Ethyl Alcohol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Ethyl Alcohol**, whether or not known skin contact has occurred.

* Do not eat, smoke, or drink where **Ethyl Alcohol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Ethyl Alcohol**. Wear protective gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **1000 ppm**, use a MSHA/NIOSH approved respirator with an organic vapor cartridge/canister. More protection is provided by a full facepiece respirator than by a half-mask respirator, and even greater protection is provided by a powered-air purifying respirator.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Ethyl Alcohol**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **3300 ppm** is immediately dangerous to life and health. If the possibility of exposure above exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Ethyl Alcohol** you should be trained on its proper handling and storage.
* **Ethyl Alcohol** must be stored to avoid contact with OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES) since violent reactions occur.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT or FLAME.
* Sources of ignition, such as smoking and open flames, are prohibited where **Ethyl Alcohol** is handled, used, or stored.
* Metal containers involving the transfer of **Ethyl Alcohol** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Ethyl Alcohol**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **ETHYL ALCOHOL**
DOT Number: **UN 1170**
NAERG Code: **127**
CAS Number: **64-17-5**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Ethyl Alcohol** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or foam extinguishers.
* **Ethyl Alcohol** vapors can easily form an explosive mixture with air.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Ethyl Alcohol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Ethyl Alcohol** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Ethyl Alcohol** as a WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 43.9 mm Hg at 68°F (20°C)
Flash Point: 55°F (12.8°C)
Water Solubility: Miscible (mixes in water)

OTHER COMMONLY USED NAMES

Chemical Name:
Ethanol
Other Names:
Alcohol; Ethyl Hydrate; Ethyl Hydroxide; Methylcarbinol

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Ethyl Alcohol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Ethyl Alcohol

SYNONYM(s): Ethanol; Ethyl Hydrate; Grain Alcohol; Methyl Carbinol; Jaysol; Anhydrol

IMIS: 1060

CAS: 64-17-5

NIOSH: RTECS KQ6300000; 35026

DOT: UN1170 Flammable Liquid

DESCRIPTION:

MW: 46.07
BP: 78 deg C
MOLFM: C2H6O FP: 13 deg C

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 1000 ppm, 1900 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 1000 ppm, 1900 mg/m3 TWA

THRESHOLD LIMIT VALUE: 1000 ppm, 1880 mg/m3 TWA; Appendix A4 (Not Classifiable as a Human Carcinogen) (TLV listed under Ethanol)

RECOMMENDED EXPOSURE LIMIT: 1000 ppm TWA

Health Factors

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Marked (HE14) Narcosis (HE8) Reproductive impairment (HE5)

Monitoring

SLC1:

MEDIA: Two Anasorb 747 Adsorbent Tubes (Front Tube 400mg /

Second Tube 200mg)
ANL SOLVENT: (40:60) Carbon Disulfide/Dimethylformamide
MAX V: 12 Liter **MAX F:** 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (OSHA 100)
SAE: 0.08
CLASS: Fully Validated
NOTE: Separate and seal each tube after sampling.

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/2-Butanol
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 1 Liter **MAX F:** 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 1400)
SAE: 0.24
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 112L **RANGE:** 25-2000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 29701 **RANGE:** 100-3,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 95097 **RANGE:** 200-10,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 104SA **RANGE:** 0.05-5.0%
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.3 ppm @ 9.7 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-2,000 ppm @ 9.5 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 12/08/1998

NIOSH Pocket Guide to Chemical Hazards

Ethyl alcohol	CAS 64-17-5
CH_3CH_2OH	RTECS KQ6300000
Synonyms & Trade Names Alcohol, Cologne spirit, Ethanol, EtOH, Grain alcohol	**DOT ID & Guide** 1170 127

Exposure Limits	NIOSH REL: TWA 1000 ppm (1900 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1900 mg/m^3)
IDLH 3300 ppm [10%LEL] See: 64175	**Conversion** 1 ppm = 1.89 mg/m^3

Physical Description
Clear, colorless liquid with a weak, ethereal, vinous odor.

MW: 46.1	BP: 173°F	FRZ: -173°F	Sol: Miscible
VP: 44 mmHg	IP: 10.47 eV		Sp.Gr: 0.79
Fl.P: 55°F	UEL: 19%	LEL: 3.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, potassium dioxide, bromine pentafluoride, acetyl bromide, acetyl chloride, platinum, sodium

Measurement Method
Charcoal tube; 2-Butanol/CS_2; Gas chromatography/Flame ionization detection; IV [#1400, Alcohols I] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 3300 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose; headache, drowsiness, fatigue, narcosis; cough; liver damage; anemia; reproductive, teratogenic effects

Target Organs Eyes, skin, respiratory system, central nervous system, liver, blood, reproductive system

See also: INTRODUCTION See ICSC CARD: 0044 See MEDICAL TESTS: 0097

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ALCOHOL

MSDS Number: M2015 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Wood alcohol; methanol; carbinol
CAS No.: 67-56-1
Molecular Weight: 32.04
Chemical Formula: CH3OH
Product Codes:
J.T. Baker: 5217, 5370, 5794, 5807, 5811, 5842, 5869, 9049, 9063, 9067, 9069, 9070, 9071, 9073, 9075, 9076, 9077, 9091, 9093, 9096, 9097, 9098, 9263, 9893
Mallinckrodt: 3004, 3006, 3016, 3017, 3018, 3024, 3041, 3701, 4295, 5160, 8814, H080, H488, H603, V079, V571

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Alcohol	67-56-1	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of overexposure may include headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma, and death. A person may get better but then worse again up to 30 hours later.
Ingestion:
Toxic. Symptoms parallel inhalation. Can intoxicate and cause blindness. Usual fatal dose: 100-125 milliliters.
Skin Contact:
Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure.
Eye Contact:
Irritant. Continued exposure may cause eye lesions.
Chronic Exposure:
Marked impairment of vision and enlargement of the liver has been reported. Repeated or prolonged exposure may cause skin irritation.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:
lel: 7.3; uel: 36
Flammable.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition source and flash back.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Methyl Alcohol:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)
- ACGIH Threshold Limit Value (TLV):

200 ppm (TWA), 250 ppm (STEL) skin
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Miscible in water.
Specific Gravity:
0.8
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
64.5C (147F)
Melting Point:
-98C (-144F)
Vapor Density (Air=1):
1.1
Vapor Pressure (mm Hg):
97 @ 20C (68F)
Evaporation Rate (BuAc=1):
5.9

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May form carbon dioxide, carbon monoxide, and formaldehyde when heated to decomposition.
Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber, and coatings. May react with metallic aluminum and generate hydrogen gas.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Methyl Alcohol (Methanol) Oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data-standard Draize test: skin, rabbit: 20mg/24 hr. Moderate; eye, rabbit: 100 mg/24 hr. Moderate; Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Alcohol (67-56-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHANOL
Hazard Class: 3
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: METHANOL
Hazard Class: 3.2, 6.1
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Methyl Alcohol (67-56-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Alcohol (67-56-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Alcohol (67-56-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Alcohol (67-56-1)	5000	U154	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **METHYL ALCOHOL**

CAS Number: 67-56-1
DOT Number: UN 1230

RTK Substance number: 1222
Date: April 1986 Revision: April 1996

HAZARD SUMMARY

* **Methyl Alcohol** can affect you when breathed in and by passing through your skin.
* **Methyl Alcohol** is a TERATOGEN--HANDLE WITH EXTREME CAUTION.
* **Methyl Alcohol** can irritate the eyes and can cause blurred vision and/or blindness.
* Breathing **Methyl Alcohol** can irritate the nose, mouth and throat causing coughing and wheezing.
* Contact can cause skin irritation. Repeated or prolonged contact can cause dryness and cracking of the skin.
* **Methyl Alcohol** may damage the liver.
* Exposure to high concentration can cause headaches, nausea, vomiting and dizziness. It can cause death.
* **Methyl Alcohol** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Methyl Alcohol is a colorless liquid with a strong odor. It is used as a solvent and cleaner.

REASON FOR CITATION

* **Methyl Alcohol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NFPA, DEP, HHAG and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 100 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **200 ppm** averaged over a 10-hour workshift and **800 ppm** not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **200 ppm** averaged over an 8-hour workshift and **250 ppm** as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Methyl Alcohol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Methyl Alcohol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methyl Alcohol**:

* **Methyl Alcohol** can irritate the eyes and can cause blurred vision and/or blindness.
* Contact can cause skin irritation.
* Breathing **Methyl Alcohol** can irritate the nose, mouth and throat causing coughing and wheezing.
* Exposure to high concentration can cause headaches, nausea, vomiting and dizziness. It can cause death.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methyl Alcohol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health, **Methyl Alcohol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **Methyl Alcohol** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.

Other Long-Term Effects

* **Methyl Alcohol** may damage the liver.
* Repeated or prolonged contact can cause dryness and cracking of the skin.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following are recommended:

* Liver function tests.
* Exam of the eyes and vision.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Methyl Alcohol** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Methyl Alcohol # 76-148.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methyl Alcohol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methyl Alcohol.**
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* Wash any areas of the body that may have contacted **Methyl Alcohol** at the end of each work day, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Methyl Alcohol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methyl Alcohol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* **ACGIH** recommends *Nitrile Rubber* or *Viton* as good to excellent protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **200 ppm**, use an MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use an MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **25,000 ppm** is immediately dangerous to life and health. If the possibility of exposures above **25,000 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Methyl Alcohol** you should be trained on its proper handling and storage.
* **Methyl Alcohol** must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE).
* Store in tightly closed containers in a cool well-ventilated area away from HEAT.
* Sources of ignition such as smoking and open flames are prohibited where **Methyl Alcohol** is handled, used, or stored.
* Metal containers involving the transfer of **Methyl Alcohol** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Alcohol**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **METHYL ALCOHOL**
DOT Number: **UN 1230**
NAERG Code: **131**
CAS Number: **67-56-1**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
FLAMMABLE LIQUID POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Methyl Alcohol** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers and water to keep fire exposed containers cool.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Formaldehyde*.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methyl Alcohol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Methyl Alcohol** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Methyl Alcohol** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 97 mm Hg at 68°F (20°C)
Flash Point: 52°F (11°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
Methanol
Other Names:
Wood Alcohol; Carbinol; Methylol

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Methyl Alcohol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methyl Alcohol

SYNONYM(s): Methanol; Wood alcohol; Columbian spirits; Carbinol

IMIS: 1660

CAS: 67-56-1

NIOSH: RTECS PC1400000; 48518

DOT: UN1230 Flammable Liquid; Poison

DESCRIPTION:

Colorless liquid with a characteristic, pungent odor.
MW: 32
BP: 148 F
VP: 97 mm
MP: -144 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 260 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 260 mg/m3 TWA

THRESHOLD LIMIT VALUE: 200 ppm, 262 mg/m3 TWA; 250 ppm, 328 mg/m3 STEL (Skin); (TLV listed under Methanol)

RECOMMENDED EXPOSURE LIMIT: 200 ppm TWA (Skin); 250 ppm STEL (Skin)

Health Factors

SYMPTOM(s): Eye irritation; headaches, drowsiness, lightheadedness; nausea, vomiting; visual disturbance, blindness

HEALTH EFFECTS: Cumulative CNS effects (HE7); Narcosis (HE8) Irritation-Eye, Nose, Throat, Skin---Mild (HE16)

ORGAN: Eyes, skin, CNS, GI tract

Monitoring

SLC1:

MEDIA: Two Anasorb 747 Tubes in series(First tube 400mg, second tube 200 mg section) See note
ANL SOLVENT: 50:50 Carbon Disulfide:Dimethylformamide
MAX V: 3 Liters (RH<50% @ 25 C) **MAX F:** 0.05 L/min (TWA)
MAX V: 5 Liters (RH>50% @ 25 C) **MAX F:** 0.05 L/min (TWA)
MAX V: 0.75 Liters **MAX F:** 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 91)
SAE: 0.09
CLASS: Fully Validated .
NOTE: Separate tubes and seal each after sampling.

MEDIA: Silica Gel Tube (520/260 mg sections, 20/40 mesh)
ANL SOLVENT: 0.02 N H2SO4
MAX V: 6 Liters **MAX F:** 0.1 L/min (TWA)
MAX V: 1.5 Liters **MAX F:** 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 1,2 (OSHA Modified NIOSH 2000)
SAE: 0.16
CLASS: Fully Validated
NOTE: The larger size tube is recommended due to low capacity of the 150/75 mg tubes at high humidities.

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 111L **RANGE:** 25-1000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 29701 **RANGE:** 100-3,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: 67 28941 **RANGE:** 50-3,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 95097 **RANGE:** 100-10,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 119U **RANGE:** 20-1000 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.3 ppm @ 9.7 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-300 ppm @ 9.9 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 01/12/1999

NIOSH Pocket Guide to Chemical Hazards

Methyl alcohol	**CAS** 67-56-1
CH_3OH	**RTECS** PC1400000
Synonyms & Trade Names Carbinol, Columbian spirits, Methanol, Pyroligneous spirit, Wood alcohol, Wood naphtha, Wood spirit	**DOT ID & Guide** 1230 131

Exposure Limits	NIOSH REL: TWA 200 ppm (260 mg/m^3) ST 250 ppm (325 mg/m^3) [skin]
	OSHA PEL†: TWA 200 ppm (260 mg/m^3)
IDLH 6000 ppm See: 67561	**Conversion** 1 ppm = 1.31 mg/m^3

Physical Description
Colorless liquid with a characteristic pungent odor.

MW: 32.1	BP: 147°F	FRZ: -144°F	Sol: Miscible
VP: 96 mmHg	IP: 10.84 eV		Sp.Gr: 0.79
Fl.P: 52°F	UEL: 36%	LEL: 6.0%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Si gel; Water/Isopropanol; Gas chromatography/Flame ionization detection; IV [#2000, Methanol]
See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator
Up to 5000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 6000 ppm: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, upper respiratory system; headache, drowsiness, dizziness, vertigo (an illusion of movement), lightheadedness, nausea, vomiting; visual disturbance, optic nerve damage (blindness); dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract
See also: INTRODUCTION See ICSC CARD: 0057 See MEDICAL TESTS: 0137

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

2-BUTOXYETHANOL

MSDS Number: B6100 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Butyl cellosolve(tm); Ethylene glycol monobutyl ether
CAS No.: 111-76-2
Molecular Weight: 118.18
Chemical Formula: HOCH2CH2OC4H9
Product Codes: J.T. Baker: D648, D649 Mallinckrodt: 2138

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
2-Butoxyethanol	111-76-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES EYE IRRITATION. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD-FORMING ORGANS, KIDNEYS, LIVER AND LYMPHOID SYSTEM. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include sore throat, coughing, headache, nausea and shortness of breath. High concentrations have a narcotic effect.

Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Toxic! May cause systemic poisoning with symptoms paralleling those of inhalation.

Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:
Vapors are irritating and may produce immediate pain, redness and tearing. Splashes can cause severe pain, stinging, swelling.

Chronic Exposure:
Prolonged or repeated exposures can cause damage to the liver, kidneys, lymphoid system, blood and blood-forming organs.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, blood, respiratory or lymphoid system function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes,

lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:
Flash point: 62C (144F) Autoignition temperature: 238C (460F) Flammable limits in air % by volume: lel: 1.1; uel: 12.7 Combustible Liquid.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Do not use a solid stream of water, since the stream will scatter and spread the fire. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 50 ppm skin -ACGIH Threshold Limit Value (TLV): 25 ppm (TWA) skin

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. This compound possibly exists in both particulate and vapor phase. A dust/mist prefilter should be used for the particulate.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Mild odor.

Solubility:
Soluble in water.

Specific Gravity:
0.90 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
171C (340F)

Melting Point:
-70C (-94F)

Vapor Density (Air=1):
4.07

Vapor Pressure (mm Hg):
0.8 @ 20C (68F)

Evaporation Rate (BuAc=1):
0.07

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers, strong bases. May attack metallic aluminum at high temperatures.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 470 mg/kg; Inhalation rat LC50: 450ppm/4H; Skin rabbit LD50: 220 mg/kg; investigated as a tumorigen, mutagen, reproductive effector

Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
2-Butoxyethanol (111-76-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to evaporate significantly. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into

water, this material is not expected to evaporate significantly. When released into water, this material may biodegrade to a moderate extent. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                        TSCA  EC   Japan  Australia
----------------------------------------------    ----  ---  -----  ---------
2-Butoxyethanol (111-76-2)                         Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                        --Canada--
Ingredient                                        Korea  DSL   NDSL  Phil.
----------------------------------------------    -----  ---   ----  -----
2-Butoxyethanol (111-76-2)                         Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
2-Butoxyethanol (111-76-2)                No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                        -RCRA-    -TSCA-
Ingredient                                CERCLA        261.33     8(d)
----------------------------------------  ------        ------    ------
2-Butoxyethanol (111-76-2)                No            No         Yes


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 2R
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 2 **Flammability:** 2 **Reactivity:** 0

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES EYE IRRITATION. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD-FORMING ORGANS, KIDNEYS, LIVER AND LYMPHOID SYSTEM. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT.

Label Precautions:
Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat and flame.

Label First Aid:
In all cases call a physician immediately. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **2-BUTOXY ETHANOL**

CAS Number: 111-76-2
DOT Number: UN 2369

RTK Substance number: 0275
Date: February 1989 Revision: November 1994

HAZARD SUMMARY

* **2-Butoxy Ethanol** can affect you when breathed in and by passing through your skin.
* Exposure may cause reproductive damage. Handle with extreme caution.
* Exposure can irritate the eyes, nose, and throat. Higher exposure can cause you to become dizzy, lightheaded, and to pass out.
* High or repeated exposure may break down red blood cells, and cause anemia.
* **2-Butoxy Ethanol** may damage the liver and kidneys.

IDENTIFICATION

2-Butoxy Ethanol is a colorless liquid. It is used as a solvent in making plastics and in dry cleaning.

REASON FOR CITATION

* **2-Butoxy Ethanol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NFPA and NIOSH.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from you employer.
* If you think you are experiencing any workrelated health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 0.10 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** averaged over an 8-hour workshift.

ACGIH: The recommended airborne exposure limit is **25 ppm** averaged over an 8-hour workshift.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits lmsted above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing
* Wash thoroughly immediately after exposure to **2-Butoxy Ethanol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **2-Butoxy Ethanol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **2-Butoxy Ethanol**:

* Exposure to **2-Butoxy Ethanol** can irritate the eyes, nose, mouth and throat. Higher exposure can cause you to become dizzy, lightheaded, and to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **2-Butoxy Ethanol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **2-Butoxy Ethanol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **2-Butoxy Ethanol** may damage the developing fetus.
* **2-Butoxy Ethanol** may damage the testes (male reproductive glands).

Other Long-Term Effects

* Long-term exposure may break down red blood cells, and cause anemia.
* **2-Butoxy Ethanol** may damage the liver and kidneys.
* Very irritating substances may affect the lungs. It is not known whether **2-Butoxy Ethanol** causes lung damage.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, for those with frequent or potentially high exposures, the following are recommended:

* Urinalysis and kidney function tests.
* Complete blood count with reticulocyte count.
* Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **2-Butoxy Ethanol** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **2-Butoxy Ethanol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **2-Butoxy Ethanol**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **2-Butoxy Ethanol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **2-Butoxy Ethanol**, whether or not known skin contact has occurred.

* Do not eat, smoke, or drink where **2-Butoxy Ethanol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **2-Butoxy Ethanol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Butyl, Neoprene* or *Nitrile rubbers* as protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over **25 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge. More protection is provided by a powered air-purifying respirator.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **2-Butoxy Ethanol**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode.
* Exposure to **700 ppm** is immediately dangerous to life and health. If the possibility of exposure above **700 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **2-Butoxy Ethanol** you should be trained on its proper handling and storage.
* **2-Butoxy Ethanol** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT.
* Sources of ignition, such as smoking and open flames, are prohibited where **2-Butoxy Ethanol** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **2-BUTOXY ETHANOL**
DOT Number: **UN 2369**
NAERG Code: **152**
CAS Number: **111-76-2**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	2
REACTIVITY	-	0
COMBUSTIBLE POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **2-Butoxy Ethanol** is a COMBUSTIBLE LIQUID.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use dry chemical, CO_2, water spray, or alcohol foam extinguishers.
* Water can be used to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **2-Butoxy Ethanol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of **2-Butoxy Ethanol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

==========

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

==========

HANDLING AND STORAGE (See page 3)

FIRST AID

In N.J. POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0.6 mm Hg at 68°F (20°C)
Flash Point: 140°F (60°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
Ethanol, 2-Butoxy-
Other Names:
Butyl Cellosolve; Butyl Oxitol; Ethylene Glycol Monobutyl Ether

---

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
2-Butoxyethanol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2-Butoxyethanol

SYNONYM(s): Butyl cellosolve; Ethyleneglycol monobutylether; Dowanol EB; Butyl oxitol; Jeffersol EB; Ektasolve EB; Ethylene glycol mono butyl ether; Ethylene glycol monobutyl ether

IMIS: 0435

CAS: 111-76-2

NIOSH: RTECS KJ8575000; 34274

DOT: UN2369 Flammable Liquid

DESCRIPTION:

MW: 118.20
BP: 171 deg C
VP: 0.6 mm
MOLFM: C6H14O2 Colorless liquid with a mild odor.

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 50 ppm, 240 mg/m3 TWA (Skin)

OSHA CONSTRUCTION INDUSTRY STANDARDS: 50 ppm, 240 mg/m3 TWA (Skin)

THRESHOLD LIMIT VALUE: 25 ppm, 121 mg/m3 TWA (Skin)

Health Factors

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 48 Liter **MAX F:** 0.1 L/min
ANL 1: Gas Chromatography; GC/FID

REF: 1 (OSHA 83)
SAE: 0.15
CLASS: Fully Validated

WIPE:

Wipe with charcoal pad, seal in glass vial for shipment.

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 05/18/1993

NIOSH Pocket Guide to Chemical Hazards

2-Butoxyethanol	CAS 111-76-2
$C_4H_9OCH_2CH_2OH$	RTECS KJ8575000
Synonyms & Trade Names Butyl Cellosolve®, Butyl oxitol, Dowanol® EB, EGBE, Ektasolve EB®, Ethylene glycol monobutyl ether, Jeffersol EB	**DOT ID & Guide** 2369 152

Exposure Limits	
	NIOSH REL: TWA 5 ppm (24 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (240 mg/m^3) [skin]
IDLH 700 ppm See: 111762	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 118.2	BP: 339°F	FRZ: -107°F	Sol: Miscible
VP: 0.8 mmHg	IP: 10.00 eV		Sp.Gr: 0.90
Fl.P: 143°F	UEL(275°F): 12.7%	LEL(200°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics

Measurement Method
Charcoal tube; Methanol/CH_2Cl_2; Gas chromatography/Flame ionization detection; IV [#1403, Alcohols IV] See: NMAM INDEX

Personal Protection & Sanitation	First Aid (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R. Provide: Quick drench	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 700 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination

with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms irritation eyes, skin, nose, throat; hemolysis, hemoglobinuria; central nervous system depressant/depression, headache; vomiting
Target Organs Eyes, skin, respiratory system, central nervous system, hematopoietic system, blood, kidneys, liver, lymphoid system
See also: INTRODUCTION See ICSC CARD: 0059 See MEDICAL TESTS: 0029

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

2-BUTOXYETHANOL

MSDS Number: B6100 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Butyl cellosolve(tm); Ethylene glycol monobutyl ether
CAS No.: 111-76-2
Molecular Weight: 118.18
Chemical Formula: HOCH2CH2OC4H9
Product Codes: J.T. Baker: D648, D649 Mallinckrodt: 2138

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
2-Butoxyethanol	111-76-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES EYE IRRITATION. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD-FORMING ORGANS, KIDNEYS, LIVER AND LYMPHOID SYSTEM. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include sore throat, coughing, headache, nausea and shortness of breath. High concentrations have a narcotic effect.

Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Toxic! May cause systemic poisoning with symptoms paralleling those of inhalation.

Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:
Vapors are irritating and may produce immediate pain, redness and tearing. Splashes can cause severe pain, stinging, swelling.

Chronic Exposure:
Prolonged or repeated exposures can cause damage to the liver, kidneys, lymphoid system, blood and blood-forming organs.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, blood, respiratory or lymphoid system function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes,

lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:
Flash point: 62C (144F) Autoignition temperature: 238C (460F) Flammable limits in air % by volume: lel: 1.1; uel: 12.7 Combustible Liquid.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Do not use a solid stream of water, since the stream will scatter and spread the fire. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 50 ppm skin -ACGIH Threshold Limit Value (TLV): 25 ppm (TWA) skin

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. This compound possibly exists in both particulate and vapor phase. A dust/mist prefilter should be used for the particulate.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Mild odor.

Solubility:
Soluble in water.

Specific Gravity:
0.90 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
171C (340F)

Melting Point:
-70C (-94F)

Vapor Density (Air=1):
4.07

Vapor Pressure (mm Hg):
0.8 @ 20C (68F)

Evaporation Rate (BuAc=1):
0.07

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers, strong bases. May attack metallic aluminum at high temperatures.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 470 mg/kg; Inhalation rat LC50: 450ppm/4H; Skin rabbit LD50: 220 mg/kg; investigated as a tumorigen, mutagen, reproductive effector

Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
2-Butoxyethanol (111-76-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to evaporate significantly. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into

water, this material is not expected to evaporate significantly. When released into water, this material may biodegrade to a moderate extent. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. (ETHYLENE GLYCOL MONOBUTYL ETHER)
Hazard Class: 6.1
UN/NA: UN2810
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\--------------------------------
Ingredient                                        TSCA  EC   Japan  Australia
---------------------------------------------   ----  ---  -----  ---------
2-Butoxyethanol (111-76-2)                       Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\--------------------------------
                                                         --Canada--
Ingredient                                        Korea  DSL   NDSL  Phil.
---------------------------------------------   -----  ---   ----  -----
2-Butoxyethanol (111-76-2)                       Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
2-Butoxyethanol (111-76-2)                No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                      -RCRA-    -TSCA-
Ingredient                                CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
2-Butoxyethanol (111-76-2)                No          No         Yes

Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: 2R
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 2 **Flammability:** 2 **Reactivity:** 0

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES EYE IRRITATION. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD-FORMING ORGANS, KIDNEYS, LIVER AND LYMPHOID SYSTEM. COMBUSTIBLE LIQUID AND VAPOR. MAY CAUSE IRRITATION TO SKIN AND RESPIRATORY TRACT.

Label Precautions:
Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat and flame.

Label First Aid:
In all cases call a physician immediately. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: 2-BUTOXY ETHANOL

CAS Number: 111-76-2
DOT Number: UN 2369

RTK Substance number: 0275
Date: February 1989 Revision: November 1994

HAZARD SUMMARY

* **2-Butoxy Ethanol** can affect you when breathed in and by passing through your skin.
* Exposure may cause reproductive damage. Handle with extreme caution.
* Exposure can irritate the eyes, nose, and throat. Higher exposure can cause you to become dizzy, lightheaded, and to pass out.
* High or repeated exposure may break down red blood cells, and cause anemia.
* **2-Butoxy Ethanol** may damage the liver and kidneys.

IDENTIFICATION

2-Butoxy Ethanol is a colorless liquid. It is used as a solvent in making plastics and in dry cleaning.

REASON FOR CITATION

* **2-Butoxy Ethanol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NFPA and NIOSH.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from you employer.
* If you think you are experiencing any workrelated health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 0.10 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** averaged over an 8-hour workshift.

ACGIH: The recommended airborne exposure limit is **25 ppm** averaged over an 8-hour workshift.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits lmsted above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing
* Wash thoroughly immediately after exposure to **2-Butoxy Ethanol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **2-Butoxy Ethanol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **2-Butoxy Ethanol**:

* Exposure to **2-Butoxy Ethanol** can irritate the eyes, nose, mouth and throat. Higher exposure can cause you to become dizzy, lightheaded, and to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **2-Butoxy Ethanol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **2-Butoxy Ethanol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **2-Butoxy Ethanol** may damage the developing fetus.
* **2-Butoxy Ethanol** may damage the testes (male reproductive glands).

Other Long-Term Effects

* Long-term exposure may break down red blood cells, and cause anemia.
* **2-Butoxy Ethanol** may damage the liver and kidneys.
* Very irritating substances may affect the lungs. It is not known whether **2-Butoxy Ethanol** causes lung damage.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, for those with frequent or potentially high exposures, the following are recommended:

* Urinalysis and kidney function tests.
* Complete blood count with reticulocyte count.
* Liver function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **2-Butoxy Ethanol** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **2-Butoxy Ethanol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **2-Butoxy Ethanol**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **2-Butoxy Ethanol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **2-Butoxy Ethanol**, whether or not known skin contact has occurred.

* Do not eat, smoke, or drink where **2-Butoxy Ethanol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **2-Butoxy Ethanol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Butyl, Neoprene* or *Nitrile rubbers* as protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over **25 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge. More protection is provided by a powered air-purifying respirator.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **2-Butoxy Ethanol**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode.
* Exposure to **700 ppm** is immediately dangerous to life and health. If the possibility of exposure above **700 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **2-Butoxy Ethanol** you should be trained on its proper handling and storage.
* **2-Butoxy Ethanol** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE).
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT.
* Sources of ignition, such as smoking and open flames, are prohibited where **2-Butoxy Ethanol** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **2-BUTOXY ETHANOL**
DOT Number: **UN 2369**
NAERG Code: **152**
CAS Number: **111-76-2**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	2
REACTIVITY	-	0
COMBUSTIBLE POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **2-Butoxy Ethanol** is a COMBUSTIBLE LIQUID.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use dry chemical, CO_2, water spray, or alcohol foam extinguishers.
* Water can be used to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **2-Butoxy Ethanol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of **2-Butoxy Ethanol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

==========

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

==========

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0.6 mm Hg at 68°F (20°C)
Flash Point: 140°F (60°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
Ethanol, 2-Butoxy-
Other Names:
Butyl Cellosolve; Butyl Oxitol; Ethylene Glycol Monobutyl Ether

---

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
2-Butoxyethanol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2-Butoxyethanol

SYNONYM(s): Butyl cellosolve; Ethyleneglycol monobutylether; Dowanol EB; Butyl oxitol; Jeffersol EB; Ektasolve EB; Ethylene glycol mono butyl ether; Ethylene glycol monobutyl ether

IMIS: 0435

CAS: 111-76-2

NIOSH: RTECS KJ8575000; 34274

DOT: UN2369 Flammable Liquid

DESCRIPTION:

MW: 118.20
BP: 171 deg C
VP: 0.6 mm
MOLFM: C6H14O2 Colorless liquid with a mild odor.

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 50 ppm, 240 mg/m3 TWA (Skin)

OSHA CONSTRUCTION INDUSTRY STANDARDS: 50 ppm, 240 mg/m3 TWA (Skin)

THRESHOLD LIMIT VALUE: 25 ppm, 121 mg/m3 TWA (Skin)

Health Factors

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 48 Liter **MAX F:** 0.1 L/min
ANL 1: Gas Chromatography; GC/FID

NIOSH Pocket Guide to Chemical Hazards

2-Butoxyethanol	CAS 111-76-2
$C_4H_9OCH_2CH_2OH$	RTECS KJ8575000
Synonyms & Trade Names Butyl Cellosolve®, Butyl oxitol, Dowanol® EB, EGBE, Ektasolve EB®, Ethylene glycol monobutyl ether, Jeffersol EB	**DOT ID & Guide** 2369 152

Exposure Limits	NIOSH REL: TWA 5 ppm (24 mg/m^3) [skin]
	OSHA PEL†: TWA 50 ppm (240 mg/m^3) [skin]
IDLH 700 ppm See: 111762	**Conversion** 1 ppm = 4.83 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 118.2	BP: 339°F	FRZ: -107°F	Sol: Miscible
VP: 0.8 mmHg	IP: 10.00 eV		Sp.Gr: 0.90
Fl.P: 143°F	UEL(275°F): 12.7%	LEL(200°F): 1.1%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, strong caustics

Measurement Method
Charcoal tube; Methanol/CH_2Cl_2; Gas chromatography/Flame ionization detection; IV [#1403, Alcohols IV] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R. Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 50 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
Up to 250 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 700 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination

with an auxiliary self-contained positive-pressure breathing apparatus Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms irritation eyes, skin, nose, throat; hemolysis, hemoglobinuria; central nervous system depressant/depression, headache; vomiting
Target Organs Eyes, skin, respiratory system, central nervous system, hematopoietic system, blood, kidneys, liver, lymphoid system
See also: INTRODUCTION See ICSC CARD: 0059 See MEDICAL TESTS: 0029

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **2-ETHOXYETHANOL**

CAS Number: 110-80-5
DOT Number: UN 1171

RTK Substance number: 0839
Date: February 1989 Revision: April 1996

HAZARD SUMMARY

* **2-Ethoxyethanol** can affect you when breathed in and by passing through your skin.
* **2-Ethoxyethanol** should be handled as a TERATOGEN--WITH EXTREME CAUTION.
* It may damage the testes, resulting in decreased fertility.
* **2-Ethoxyethanol** can cause eye and skin irritation.
* Breathing **2-Ethoxyethanol** can irritate the nose and throat.
* Exposure may damage blood cells causing a low blood count (*anemia*).
* High exposure can affect the nervous system causing headache, drowsiness, weakness, fatigue, personality changes and even passing out.
* **2-Ethoxyethanol** may damage the kidneys.

IDENTIFICATION

2-Ethoxyethanol is a colorless liquid with a mild, sweetish odor. It is widely used as a solvent and as a de-icing additive in brake fluids and aviation and automobile fuels.

REASON FOR CITATION

* **2-Ethoxyethanol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NFPA, EPA, DEP and HHAG.
* This chemical is on the Special Health Hazard Substance List because it is a **TERATOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 2.7 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.5 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **5 ppm** averaged over an 8-hour workshift.

* **2-Ethoxyethanol** may be a TERATOGEN in humans. All contact with this chemical should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **2-Ethoxyethanol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **2-Ethoxyethanol**:

* **2-Ethoxyethanol** can cause eye and skin irritation.
* Breathing **2-Ethoxyethanol** can irritate the nose and throat.
* High exposure can affect the nervous system causing headache, drowsiness, weakness, fatigue, personality changes and even passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **2-Ethoxyethanol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health, **2-Ethoxyethanol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **2-Ethoxyethanol** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.
* **2-Ethoxyethanol** may damage the testes (male reproductive glands) and decrease fertility in males.

Other Long-Term Effects

* Exposure may damage blood cells causing a low blood count (*anemia*).
* **2-Ethoxyethanol** may damage the kidneys.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following are recommended before beginning work and at regular times after that:

* Complete blood count.

If symptoms develop or overexposure is suspected, the following may be useful:

* Kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **2-Ethoxyethanol** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *2-Ethoxyethanol #83-112*.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **2-Ethoxyethanol** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.

* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **2-Ethoxyethanol**.
* Wash any areas of the body that may have contacted **2-Ethoxyethanol** at the end of each workday, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **2-Ethoxyethanol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **2-Ethoxyethanol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Forsburg recommends *Butyl* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **0.5 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **2-Ethoxyethanol** you should be trained on its proper handling and storage.
* **2-Ethoxyethanol** must be stored to avoid contact with STRONG OXIDIZERS (such as NITRATES, PERMANGANATES, CHLORINE, BROMINE and FLUORINE) since violent reactions occur.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT.
* Sources of ignition, such as smoking and open flames, are prohibited where **2-Ethoxyethanol** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.)..

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **2-ETHOXYETHANOL**
DOT Number: **UN 1171**
NAERG Code: **127**
CAS Number: **110-80-5**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	2
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **2-Ethoxyethanol** is a COMBUSTIBLE LIQUID.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Vapors may travel to a source of ignition and flash back.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **2-Ethoxyethanol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **2-Ethoxyethanol** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **2-Ethoxyethanol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 4 mm Hg at 68°F (20°C)
Flash Point: 120°F (48.9°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
Ethanol, 2-Ethoxy-
Other Names:
Cellosolve; Ethylene Glycol Monoethyl Ether; Dowanol EE

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
2-Ethoxyethanol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2-Ethoxyethanol

SYNONYM(s): Ethylene glycol monoethyl ether; Cellosolve

IMIS: 1033

CAS: 110-80-5

NIOSH: RTECS KK8050000; 34448

DOT: UN1171; Combustible Liquid

DESCRIPTION:

Colorless liquid with a sweetish odor.
MW: 90.1
BP: 275 deg F
VP: 4 mm
MP: -94 deg F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 740 mg/m3 (Skin)

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 740 mg/m3 TWA (Skin)

THRESHOLD LIMIT VALUE: 5 ppm, 18 mg/m3 TWA (Skin)

RECOMMENDED EXPOSURE LIMIT: 0.5 ppm TWA (Skin)

Health Factors

SYMPTOM(s): In animals: pulmonary irritation; hematologic effects; liver, kidney, lung damage; eye irritation

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Moderate (HE15) Cumulative Blood Disturbances (HE12)

ORGAN: In animals: lungs, eyes, blood, kidneys, liver

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 48 Liters **MAX F:** 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 79)
SAE: 0.10
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** MSA
PART #: 95097 **RANGE:** 50-1000 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.2 ppm @ 8.9 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-400 ppm @ 11.1 um
CLASS: Mfg

WIPE:

Wipe with charcoal pad, seal in glass vial for shipment.

◀ OSHA Chemical Sampling Information - Table of Contents

Revision Date: 05/18/1993

NIOSH Pocket Guide to Chemical Hazards

2-Ethoxyethanol	**CAS** 110-80-5
$C_2H_5OCH_2CH_2OH$	**RTECS** KK8050000
Synonyms & Trade Names Cellosolve®, EGEE, Ethylene glycol monoethyl ether	**DOT ID & Guide** 1171 127

Exposure Limits	NIOSH REL: TWA 0.5 ppm (1.8 mg/m^3) [skin]
	OSHA PEL: TWA 200 ppm (740 mg/m^3) [skin]

IDLH 500 ppm See: 110805	**Conversion** 1 ppm = 3.69 mg/m^3

Physical Description
Colorless liquid with a sweet, pleasant, ether-like odor.

MW: 90.1	BP: 275°F	FRZ: -130°F	Sol: Miscible
VP: 4 mmHg	IP: ?		Sp.Gr: 0.93
Fl.P: 110°F	UEL(200°F): 15.6%	LEL(200°F): 1.7%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Charcoal tube; Methanol/CH_2Cl_2; Gas chromatography/Flame ionization detection; IV [#1403, Alcohols IV] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 10) Any supplied-air respirator*
Up to 12.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 500 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms In animals: irritation eyes, respiratory system; blood changes; liver, kidney, lung

damage; reproductive, teratogenic effects
Target Organs Eyes, respiratory system, blood, kidneys, liver, reproductive system, hematopoietic system
See also: INTRODUCTION See ICSC CARD: 0060 See MEDICAL TESTS: 0096

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYLENE GLYCOL MONOMETHYL ETHER

MSDS Number: E5300 --- *Effective Date: 04/08/97*

1. Product Identification

Synonyms: 2-methoxyethanol; methyl cellosolve(tm); methoxyhydroxyethane
CAS No.: 109-86-4
Molecular Weight: 76.09
Chemical Formula: CH3OC2H4OH
Product Codes: J.T. Baker: L718 Mallinckrodt: 4987, 5003

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
2-Methoxyethanol	109-86-4	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. MAY FORM EXPLOSIVE PEROXIDES IN AIR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD FORMING ORGANS, REPRODUCTIVE SYSTEM AND KIDNEYS. POSSIBLE BIRTH DEFECT HAZARD. MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 2 - Moderate
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors may cause irritation, headache, dizziness, fatigue, nausea, vomiting, and loss of appetite. Weakness, incoordination and tremors may occur.

Ingestion:
Moderately toxic. Can cause headache, fatigue, nausea, vomiting, dizziness, and weakness. Hemorrhagic gastritis, liver damage, pancreas damage and brain edema resulting in death has occurred in human exposure of 3 g/kg. Damage to kidneys is possible from ingestion of large quantities.

Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:
May cause irritation, redness and pain.

Chronic Exposure:
Prolonged exposure may cause injury to bone marrow, blood cells, kidney, liver and testes. A suspected human reproductive hazard and a birth defect hazard. Severe neurological disabilities has been reported from chronic industrial exposure. Symptoms have included headache, dizziness, lethargy, weakness, personality changes, apathy, unequal pupil size, and disorientation.

Aggravation of Pre-existing Conditions:
Persons with pre-existing blood or central nervous system disorders may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before

reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 39C (102F) Autoignition temperature: 286C (547F) Flammable limits in air % by volume: lel: 1.8; uel: 14 Flammable.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Be aware of possible peroxide formation. Avoid use of aluminum and magnesium equipment. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperatures and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
2-Methoxyethanol (EGME): -OSHA Permissible Exposure Limit (PEL): 25 ppm (TWA) skin, Methyl Cellosolve -ACGIH Threshold Limit Value (TLV): 5 ppm (TWA) skin

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Pleasant odor.

Solubility:
Miscible in water.

Specific Gravity:
0.96 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
124C (255F)

Melting Point:
-85.1C (-121F)

Vapor Density (Air=1):
2.62

Vapor Pressure (mm Hg):
6.2 @ 20C (68F)

Evaporation Rate (BuAc=1):
ca. 1

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Formation of explosive peroxides has been reported from auto-oxidation. Reported to dissolve aluminum from scratched or heated aluminum surfaces. Do not distill to dryness. Avoid excessive temperatures or prolonged reflux, such as in batch distillations.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers and alkalis, strong acids, high temperatures in the presence of strong bases. Contact with excessive heat, open flame, sparks, or ignition sources.

Conditions to Avoid:
Heat, flame, ignition sources, air, incompatibles

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2370 mg/kg; inhalation rat LC50: 1500 ppm/7H; skin rabbit LD50: 1280 mg/kg.

Reproductive Toxicity:
In laboratory animals, this compound has caused both birth defects and damage to the reproductive system.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
2-Methoxyethanol (109-86-4)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ETHYLENE GLYCOL MONOMETHYL ETHER
Hazard Class: 3
UN/NA: UN1188
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: ETHYLENE GLYCOL MONOMETHYL ETHER
Hazard Class: 3.3
UN/NA: UN1188
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
2-Methoxyethanol (109-86-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
2-Methoxyethanol (109-86-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
2-Methoxyethanol (109-86-4)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
2-Methoxyethanol (109-86-4)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

Prop 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2[S]
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 **Flammability:** 2 **Reactivity:** 2

Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. MAY FORM EXPLOSIVE PEROXIDES IN AIR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD FORMING ORGANS, REPRODUCTIVE SYSTEM AND KIDNEYS. POSSIBLE BIRTH DEFECT HAZARD. MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

Label Precautions:
Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Keep away from heat, sparks and flame. Keep container closed. Wash thoroughly after handling. Use only with adequate ventilation.

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **2-METHOXYETHANOL**

CAS Number: 109-86-4
DOT Number: UN 1188

RTK Substance number: 1211
Date: April 1986 Revision: April 1996

HAZARD SUMMARY

* **2-Methoxyethanol** can affect you when breathed in and by passing through your skin.
* **2-Methoxyethanol** should be handled as a TERATOGEN--WITH EXTREME CAUTION.
* **2-Methoxyethanol** may damage the testes (male reproductive glands).
* Exposure can cause irritation of the eyes, nose, throat and lungs with cough and/or shortness of breath.
* Repeated exposure can cause headaches, weakness, drowsiness, personality changes and tremors.
* Prolonged exposure can cause a low blood count (*anemia*).
* **2-Methoxyethanol** may damage the kidneys.

IDENTIFICATION

2-Methoxyethanol is a colorless liquid with a mild odor. It is used as a solvent for resins, lacquers, paints and varnishes. It can also be found in cleaning compounds, cosmetics and as a fuel de-icer additive.

REASON FOR CITATION

* **2-Methoxyethanol** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, NFPA and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 2.3 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **25 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.1 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **5 ppm** averaged over an 8-hour workshift.

* **2-Methoxyethanol** may be a TERATOGEN in humans. All contact with this chemical should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limit(s) listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **2-Methoxyethanol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **2-Methoxyethanol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **2-Methoxyethanol**:

* Exposure can cause irritation of the eyes, nose, throat and lungs with cough and/or shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **2-Methoxyethanol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **2-Methoxyethanol** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **2-Methoxyethanol** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.
* It may damage the testes (male reproductive glands) decreasing fertility in males.

Other Long-Term Effects

* Prolonged exposure can cause a low blood count (*anemia*).
* Repeated exposure can cause headaches, weakness, drowsiness, personality changes, loss of weight, upset stomach, and tremors.
* **2-Methoxyethanol** may damage the kidneys.
* Very irritating substances may affect the lungs. It is not known whether **2-Methoxyethanol** causes lung damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater, or significant skin contact), the following are recommended before beginning work and at regular times after that:

* Lung function tests.
* Complete blood count.

If symptoms develop or overexposure is suspected, the following may be useful:

* Exam of the nervous system.
* Kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **2-Methoxyethanol** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH Current Intelligence Bulletin 39: *Glycol Ethers, # 83-112.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **2-Methoxyethanol** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **2-Methoxyethanol**.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.

* On skin contact with **2-Methoxyethanol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **2-Methoxyethanol**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **2-Methoxyethanol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

CLOTHING

* Avoid skin contact with **2-Methoxyethanol**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Neoprene* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **0.1 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **200 ppm** is immediately dangerous to life and health. If the possibility of exposures above **200 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **2-Methoxyethanol** you should be trained on its proper handling and storage.
* **2-Methoxyethanol** must be stored to avoid contact with OXIDIZERS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES and NITRATES) and STRONG CAUSTICS since violent reactions occur.
* Sources of ignition such as smoking and open flames are prohibited where **2-Methoxyethanol** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Wherever **2-Methoxyethanol** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>>EMERGENCY INFORMATION<<<<<<<<<<<<<<<<<

Common Name: **2-METHOXYETHANOL**
DOT Number: **UN 1188**
NAERG Code: **127**
CAS Number: **109-86-4**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	2
REACTIVITY	-	0
COMBUSTIBLE LIQUID POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **2-Methoxyethanol** is a COMBUSTIBLE LIQUID.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use dry chemical, CO_2, water spray, or alcohol foam extinguishers.
* Vapors may travel to a source of ignition and flashback.
* Use water spray to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **2-Methoxyethanol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Use water spray to reduce vapors.
* Keep **2-Methoxyethanol** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **2-Methoxyethanol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 6 mm Hg at 68°F (20°C)
Flash Point: 107°F (40°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
2-Methoxyethanol
Other Names:
Ethylene Glycol Monomethyl Ether; EGME; MECS; Methyl Cellosolve; Methyl Glycol; Poly-Solv EM

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Methyl Cellosolve

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methyl Cellosolve

SYNONYM(s): 2-Methoxyethanol; Glycol monomethyl ether; Ethylene glycol monomethyl ether; Methyl oxitol; Ektasolve; Jeffersol EM

IMIS: 0590

CAS: 109-86-4

NIOSH: RTECS KL5775000; 34535

DOT: UN1188; Flammable Liquid

DESCRIPTION:

Colorless liquid with a mild, non-residual odor.
MW: 76
BP: 256 F
VP: 6 mm
MP: -121 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 25 ppm, 80 mg/m3 (Skin)

OSHA CONSTRUCTION INDUSTRY STANDARDS: 25 ppm, 80 mg/m3 TWA (Skin)

THRESHOLD LIMIT VALUE: 5 ppm, 16 mg/m3 TWA (Skin)

RECOMMENDED EXPOSURE LIMIT: 0.1 ppm TWA (Skin)

Health Factors

SYMPTOM(s): Headaches; drowsiness; weakness, ataxia, tremors; somnolence; anemic pallor; eye irritation; (carcinogenic)

HEALTH EFFECTS: Blood disorders (HE12); CNS effects (HE7) Suspect reproductive effects (HE5)

ORGAN: CNS, blood, skin, eyes, kidneys

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol (v/v)
MAX V: 48 Liters **MAX F:** 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 79)
SAE: 0.10
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Kitagawa
PART #: 190U **RANGE:** 5-500 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.3 ppm @ 9.6 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-50 ppm @ 8.8 um
CLASS: Mfg

WIPE:

Wipe with charcoal pad, seal in glass vial for shipment.

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 05/18/1993

NIOSH Pocket Guide to Chemical Hazards

Methyl Cellosolve®	**CAS** 109-86-4
$CH_3OCH_2CH_2OH$	**RTECS** KL5775000
Synonyms & Trade Names EGME, Ethylene glycol monomethyl ether, Glycol monomethyl ether, 2-Methoxyethanol	**DOT ID & Guide** 1188 127

Exposure Limits	NIOSH REL: TWA 0.1 ppm (0.3 mg/m^3) [skin]
	OSHA PEL: TWA 25 ppm (80 mg/m^3) [skin]
IDLH 200 ppm See: 109864	**Conversion** 1 ppm = 3.11 mg/m^3

Physical Description
Colorless liquid with a mild, ether-like odor.

MW: 76.1	BP: 256°F	FRZ: -121°F	Sol: Miscible
VP: 6 mmHg	IP: 9.60 eV		Sp.Gr: 0.96
Fl.P: 102°F	UEL: 14%	LEL: 1.8%	

Class II Combustible Liquid: Fl.P. at or above 100°F and below 140°F.

Incompatibilities & Reactivities
Strong oxidizers, caustics

Measurement Method
Charcoal tube; Methanol/CH_2Cl_2; Gas chromatography/Flame ionization detection; IV [#1403, Alcohols IV] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R. Provide: Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 1 ppm: (APF = 10) Any supplied-air respirator*
Up to 2.5 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 5 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 100 ppm: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode*
Up to 200 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact
Symptoms irritation eyes, nose, throat; headache, drowsiness, weakness; ataxia, tremor, somnolence (sleepiness, unnatural drowsiness); anemic pallor; in animals: reproductive, teratogenic effects
Target Organs Eyes, respiratory system, central nervous system, blood, kidneys, reproductive system, hematopoietic system
See also: INTRODUCTION See ICSC CARD: 0061 See MEDICAL TESTS: 0139

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYLENE GLYCOL MONOETHYL ETHER

MSDS Number: E2600 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: 2-Ethoxyethanol; Cellosolve(tm)
CAS No.: 110-80-5
Molecular Weight: 90.12
Chemical Formula: C2H5OCH2CH2OH
Product Codes: J.T. Baker: 9058, L210 Mallinckrodt: 1843, 5079

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
2-Ethoxyethanol	110-80-5	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. MAY FORM EXPLOSIVE PEROXIDES IN AIR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD FORMING ORGANS, REPRODUCTIVE SYSTEM, LIVER AND KIDNEYS. POSSIBLE BIRTH DEFECT HAZARD. MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA. MAY CAUSE IRRITATION TO SKIN.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Life)
Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include sore throat, coughing, headache, nausea and shortness of breath. High concentrations have a narcotic effect.

Ingestion:
Swallowing may cause nausea, vomiting, abdominal pain, breathing difficulties, weakness. Liver and kidney damage may result from swallowing large quantities of the material.

Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:
Vapors are irritating and may produce immediate pain, redness and tearing. Splashes can cause severe pain, stinging, swelling.

Chronic Exposure:
Prolonged exposure may cause injury to bone marrow, blood cells, kidney, liver and reproductive system. A suspected human reproductive and birth defect hazard.

Aggravation of Pre-existing Conditions:
Persons with pre-existing blood or central nervous system disorders may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.

Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 43C (109F) CC Autoignition temperature: 235C (455F) Flammable limits in air % by volume: lel: 1.7; uel: 15.7 Flammable liquid. May produce a floating fire hazard in extreme fire conditions.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated. Contact with strong oxidizers may cause fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors,

liquid); observe all warnings and precautions listed for the product. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperatures and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 200 ppm (TWA) skin -ACGIH Threshold Limit Value (TLV): 5 ppm (TWA) skin

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. (Butyl).

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Mild pleasant odor.

Solubility:
Miscible in water.

Density:

0.93 @ 20C/20C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
135C (275F)

Melting Point:
-70C (-94F)

Vapor Density (Air=1):
3.1

Vapor Pressure (mm Hg):
3.8 @ 20C (68F)

Evaporation Rate (BuAc=1):
0.32

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Do not distill to dryness. Avoid excessive temperatures or prolonged reflux, such as in batch distillations. Formation of explosive peroxides has been reported from auto-oxidation. Reported to dissolve aluminum from scratched or heated aluminum surfaces.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers, strong acids, strong bases, copper, aluminum.

Conditions to Avoid:
Heat, flame, ignition sources, air, incompatibles

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2125 mg/kg; inhalation rat LC50: 2000 ppm/7H; irritation eye rabbit, standard Draize: 50 mg moderate; skin rabbit, standard Draize: 500 mg open mild; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:
In laboratory animals, this compound has caused both birth defects and damage to the

reproductive system. Exposure to this compound has also caused decreased sperm counts in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
2-Ethoxyethanol (110-80-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ETHYLENE GLYCOL MONOETHYL ETHER
Hazard Class: 3
UN/NA: UN1171
Packing Group: III
Information reported for product/size: 20L

International (Water, I.M.O.)

Proper Shipping Name: ETHYLENE GLYCOL MONOETHYL ETHER
Hazard Class: 3.3
UN/NA: UN1171
Packing Group: III

Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: ETHYLENE GLYCOL MONOETHYL ETHER
Hazard Class: 3.3
UN/NA: UN1171
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
2-Ethoxyethanol (110-80-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
2-Ethoxyethanol (110-80-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
2-Ethoxyethanol (110-80-5)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
2-Ethoxyethanol (110-80-5)	1000	U359	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Pure / Liquid)

Prop 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 2S
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 **Flammability:** 2 **Reactivity:** 3

Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. MAY FORM EXPLOSIVE PEROXIDES IN AIR. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, BLOOD AND BLOOD FORMING ORGANS, REPRODUCTIVE SYSTEM, LIVER AND KIDNEYS. POSSIBLE BIRTH DEFECT HAZARD. MAY CAUSE BIRTH DEFECTS BASED ON ANIMAL DATA. MAY CAUSE IRRITATION TO SKIN.

Label Precautions:
Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing. Keep away from heat, sparks and flame. Keep container tightly closed. Wash thoroughly after handling. Use only with adequate ventilation.

Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ACETONE

MSDS Number: A0446 --- *Effective Date: 04/09/98*

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal
CAS No.: 67-64-1
Molecular Weight: 58.08
Chemical Formula: (CH3)2CO
Product Codes:
J.T. Baker: 5356, 5580, 5805, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9125, 9254, A134
Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Acetone	67-64-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.
Ingestion:
Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.
Skin Contact:
Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.
Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.
Chronic Exposure:
Prolonged or repeated skin contact may produce severe irritation or dermatitis.
Aggravation of Pre-existing Conditions:
Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

---

5. Fire Fighting Measures

Fire:
Flash point: -20C (-4F) CC
Autoignition temperature: 465C (869F)
Flammable limits in air % by volume:
lel: 2.5; uel: 12.8
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Acetone:
-OSHA Permissible Exposure Limit (PEL):
1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless, volatile liquid.
Odor:
Fragrant, mint-like
Solubility:
Miscible in all proportions in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
56.5C (133F) @ 760 mm Hg
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
2.0
Vapor Pressure (mm Hg):
400 @ 39.5C (104F)

Evaporation Rate (BuAc=1):
ca. 7.7

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: ACETONE
Hazard Class: 3.1
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Acetone (67-64-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Acetone (67-64-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Acetone (67-64-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Acetone (67-64-1)	5000	U002	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ACETONE**

CAS Number: 67-64-1
DOT Number: UN 1090

RTK Substance number: 0006
Date: May 1992 Revision: May 1998

HAZARD SUMMARY

* **Acetone** can affect you when breathed in and by passing through your skin.
* Exposure to a high concentration can cause you to become dizzy, lightheaded, and to pass out.
* Contact can irritate the skin. Repeated exposure can cause dryness and cracking of the skin.
* Exposure can irritate the eyes, nose and throat.
* **Acetone** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Acetone is a colorless liquid with a sweet odor. It is used as a solvent in nail polish remover and to make other chemicals.

REASON FOR CITATION

* **Acetone** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NIOSH, NFPA, DOT, DEP, EPA and HHAG.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 62 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **1,000 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **250 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **500 ppm** averaged over an 8-hour workshift and **750 ppm** as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Acetone** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Acetone** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Acetone**:

* Contact can irritate the skin.
* Exposure can irritate the eyes, nose and throat.
* Exposure to a high concentration can cause you to become dizzy, lightheaded, and to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Acetone** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Acetone** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Acetone** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* Repeated skin exposure can cause dryness and cracking of the skin.
* This chemical has not been adequately evaluated to determine whether brain or nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* **Acetone** can be measured in the blood, urine, and expired air, and can be used as an index of exposure.
* Evaluate for brain effects such as changes in memory, concentration, sleeping patterns and mood (especially irritability and social withdrawal), as well as headaches and fatigue. Consider evaluations of the cerebellar, autonomic and peripheral nervous systems. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Acetone** from drums or other storage containers to process containers.
* Before entering a confined space where **Acetone** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Acetone** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Acetone**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.

* On skin contact with **Acetone**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Acetone**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Acetone** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Acetone**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH and safety equipment manufacturers recommend *Butyl Rubber* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **250 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Acetone**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **2,500 ppm** is immediately dangerous to life and health. If the possibility of exposure above **2,500 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Acetone** you should be trained on its proper handling and storage.
* **Acetone** may explode when mixed with CHLOROFORM, CHROMIC ANHYDRIDE, or a mixture of ACETIC and NITRIC ACIDS.
* **Acetone** is not compatible with OXIDIZING MATERIALS (such as PEROXIDES, CHLORATES, PERCHLORATES, NITRATES and PERMANGANATES), ACIDS and BASES.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT, SPARKS and FLAME.
* Sources of ignition, such as smoking and open flames, are prohibited where **Acetone** is used, handled, or stored.
* Metal containers involving the transfer of **Acetone** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Acetone**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **ACETONE**
DOT Number: **UN 1090**
NAERG Code: **127**
CAS Number: **67-64-1**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE FLAMMABLE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Acetone** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, or alcohol foam extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use water spray to keep fire-exposed containers cool.
* Vapors may travel to a source of ignition and flash back.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Acetone** is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Acetone** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Acetone** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection and (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 180 mm Hg at 68°F (20°C)
Flash Point: 1°F (-17°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
2-Propanone
Other Names:
Dimethylformaldehyde; Dimethyl Ketone; Ketone Propane

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Acetone

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Acetone

SYNONYM(s): 2-Propanone; Dimethyl ketone; Composite Constituent; Rosin Core Solder Pyrolysis Product

IMIS: 0040

CAS: 67-64-1

NIOSH: RTECS AL3150000; 3044

DOT: UN1090 Flammable Liquid

DESCRIPTION:

Colorless liquid with a fragrant, mint-like odor.
MW: 58
BP: 133 F VP(77 F): 266 mm
MP: -169 F
MOLFM: C3H6O

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 1000 ppm, 2400 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 1000 ppm, 2400 mg/m3 TWA

THRESHOLD LIMIT VALUE: 500 ppm TWA; 750 ppm STEL; Appendix A4 (Not Classifiable as a Human Carcinogen)

RECOMMENDED EXPOSURE LIMIT: 250 ppm TWA

Health Factors

SYMPTOM(s): Eye, nose, throat irritation; headaches, dizziness; dermatitis

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Mild (HE16) Nervous System Disturbances---Narcosis (HE8) LD50 (oral, rat) 9750 mg/kg

ORGAN: Respiratory system, skin

Monitoring

SLC1:

MEDIA: Carbosieve S-III Tube (130/65mg sections,60/80 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liter **MAX F:** 0.05 L/min (TWA)
MAX V: 0.75 Liters **MAX F:** 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 69)
SAE: 0.13
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Kitigawa
PART #: 102SD **RANGE:** 375 - 3750 ppm
CLASS: 3rd Party **DEVICE:** Detector Tube **COMPANY:** Sensidyne
PART #: 151L **RANGE:** 375 - 3750 ppm
CLASS: 3rd Party **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 22901 **RANGE:** 100-12000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 460423 **RANGE:** 125-6500 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: Miran 103 **RANGE:** up to 2000 ppm @ 11.1 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: Miran 1A & 1B **RANGE:** 0.6 ppm @ 8.5 um
CLASS: Mfg

WIPE:

No.

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 11/17/1998

NIOSH Pocket Guide to Chemical Hazards

Acetone	**CAS** 67-64-1
$(CH_3)_2CO$	**RTECS** AL3150000
Synonyms & Trade Names Dimethyl ketone, Ketone propane, 2-Propanone	**DOT ID & Guide** 1090 127

Exposure Limits	NIOSH REL: TWA 250 ppm (590 mg/m^3)
	OSHA PEL†: TWA 1000 ppm (2400 mg/m^3)
IDLH 2500 ppm [10%LEL] See: 67641	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless liquid with a fragrant, mint-like odor.

MW: 58.1	BP: 133°F	FRZ: -140°F	Sol: Miscible
VP: 180 mmHg	IP: 9.69 eV		Sp.Gr: 0.79
Fl.P: 0°F	UEL: 12.8%	LEL: 2.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Oxidizers, acids

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1300, Ketones I] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 2500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose, throat; headache, dizziness, central nervous system depressant/depression; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0087 See MEDICAL TESTS: 0002

TEXANOL 2,2,4-Trimethyl-1,3-pentanediol Monoisobutyrate

TEXANOL 2,2,4-Trimethyl-1,3-pentanediol Monoisobutyrate is a slow evaporating, water-insoluble coalescing aid for latex paints. It provides good performance characteristics, such as scrub resistance, color development, and package stability in paints. It is an excellent coalescing aid for emulsion polymers and has excellent hydrolytic stability, allowing it to be used with a wide variety of latex emulsions including high pH acrylics. When added to an emulsion paint, TEXANOL is absorbed by the emulsion's polymeric particles, softening them and causing complete fusion when the paint film dries. Since TEXANOL is insoluble in water and therefore not in the water phase, applying the paint over a porous substrate does not result in reduced coalescing efficiency because TEXANOL is not absorbed along with the water.

List of supplemental documents available on this product:

Applications/End Uses Go

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

TEXANOL 2,2,4-Trimethyl-1,3-pentanediol Monoisobutyrate

List of Applications

- Chemical intermediate
- Coalescing aid
- Solvents

Back

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

MATERIAL SAFETY DATA SHEET
100000383/F/USA
Revision Date: 07/23/1999

---

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
Product Name: "TEXANOL" 2,2,4-Trimethyl-1,3-pentanediol Monoisobutyrate
Product Identification Number(s): 23621
Manufacturer/Supplier: Eastman Chemical Company, Kingsport, Tennessee 37662
MSDS Prepared by: Eastman Product Safety and Stewardship, Eastman Chemical Company, Kingsport, TN 37662
For Emergency Health, Safety & Environmental Information, call 800-EASTMAN
For Emergency Transportation Information, call CHEMTREC at 800-424-9300 or call 800-EASTMAN
For Other Information, call your Eastman representative or the Eastman operator at 423-229-2000 (USA)
Chemical Name: 2,2,4-trimethyl-1,3-pentanediol mono(2-methylpropanoate)
Synonym(s): 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate, EAN 000701
Molecular Formula: $C_{12}H_{24}O_3$
Molecular Weight: 216.32
Product Use: coalescing agent for emulsions

---

2. COMPOSITION/INFORMATION ON INGREDIENTS (Typical composition is given and
it may vary. A certificate of analysis can be provided.)
Weight % - Component - (CAS Registry Number)
100 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate (025265-77-4)

---

3. HAZARDS IDENTIFICATION
LOW HAZARD FOR USUAL INDUSTRIAL OR COMMERCIAL HANDLING BY TRAINED PERSONNEL
HMIS Hazard Ratings: Health - 1, Flammability - 1, Chemical Reactivity - 0
NFPA Hazard Ratings: Health - 1, Flammability - 1, Instability - 0
NOTE: HMIS and NFPA ratings involve data and interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

---

4. FIRST-AID MEASURES
Inhalation: If symptomatic, move to fresh air. Get medical attention if symptoms persist.
Eyes: Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Get medical attention if symptoms persist.
Skin: Wash with soap and water. Get medical attention if symptoms occur.
Ingestion: Seek medical advice.

---

5. FIRE FIGHTING MEASURES
Extinguishing Media: water spray, dry chemical, carbon dioxide (CO_2), foam
Special Fire-Fighting Procedures: Wear self-contained breathing apparatus and

protective clothing.
Hazardous Combustion Products: carbon dioxide, carbon monoxide
Unusual Fire and Explosion Hazards: none

---

6. ACCIDENTAL RELEASE MEASURES
Absorb spill with vermiculite or other inert material, then place in a container for chemical waste.
For Large Spills: Flush spill area with water spray. Prevent runoff from entering drains, sewers, or streams.

---

7. HANDLING AND STORAGE
Personal Precautionary Measures: No special precautionary measures should be needed under anticipated conditions of use.
Prevention of Fire and Explosion: Keep from contact with oxidizing materials.
Storage: Keep container closed.

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Exposure Limits:
ACGIH Threshold Limit Value (TLV): not established
OSHA (USA) Permissible Exposure Limit (PEL, 1989 Table Z-1-A values or section-specific standards): not established
Ventilation: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Supplementary local exhaust ventilation, closed systems, or respiratory protection may be needed in special circumstances such as poorly ventilated spaces, evaporation from large surfaces, spraying, heating, etc.
Respiratory Protection: If engineering controls do not maintain airborne concentrations to an acceptable level, an approved respirator must be worn. Respirator type: mist, organic vapor. If respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998.
Eye Protection: It is a good industrial hygiene practice to minimize eye contact.
Skin Protection: It is a good industrial hygiene practice to minimize skin contact.
Recommended Decontamination Facilities: eye bath, washing facilities

---

9. PHYSICAL AND CHEMICAL PROPERTIES
- Physical Form: liquid
- Color: colorless
- Odor: mild
- Odor Threshold: not available
- Specific Gravity at 20°C (68°F) (water = 1): 0.95
- Vapor Pressure at 20°C (68°F): 0.013 mbar (0.010 mm Hg)
- Vapor Pressure at 25°C (77°F): 0.017 mbar (0.013 mm Hg)
- Vapor Density (Air = 1): 7.5
- Evaporation Rate (n-butyl acetate = 1): 0.002
- Boiling Point: 255-260.5°C (491-500°F)
- Melting Point: -50°C (-58°F)
- Viscosity at 20°C (68°F): 13.5 mPa.s or cP
- Solubility in Water at 20°C (68°F): 500-860 mg/l
- pH: not available
- Octanol/Water Partition Coefficient: log P = 3.47, P = 2951
- Flash Point (Cleveland open cup): 120°C (248°F)
- Lower Flammable Limit at 149°C (300°F): 0.62 volume %
- Upper Flammable Limit at 201°C (394°F): 4.24 volume %

- Autoignition Temperature (ASTM D-2155): 393°C (740°F)
- Sensitivity to Mechanical Impact: insensitive at 100 kg-cm
- Sensitivity to Static Discharge: Material is unlikely to accumulate a static charge which could act as an ignition source.

---

10. STABILITY AND REACTIVITY
Stability: stable
Incompatibility: Material can react with strong oxidizing agents.
Hazardous Polymerization: will not occur

---

11. TOXICOLOGICAL INFORMATION
Effects of Exposure:
Inhalation: Low hazard for usual industrial handling or commercial handling by trained personnel.
Eyes: May cause transient irritation. However, immediate flushing of the eyes with water will minimize any irritative effect.
Skin: Low hazard for usual industrial handling or commercial handling by trained personnel.
Ingestion: Expected to be a low ingestion hazard.
Acute Toxicity Data:
Oral LD-50 (rat): 6.86 ml/kg
Oral LD-50 (male mouse): 1.6-3.2 g/kg
Inhalation LC-50 (rat): >3.55 mg/l/6 hour(s) (highest concentration tested)
Dermal LD-50 (guinea pig): >20 ml/kg (highest dose tested)
Dermal LD-50 (rabbit): >16 ml/kg (highest dose tested)
Skin irritation (guinea pig): slight
Repeated skin application (guinea pig): very slight irritation
Skin sensitization (guinea pig): none
Eye irritation (rabbit, unwashed eyes): slight to moderate
Eye irritation (rabbit, washed eyes): slight
Definitions for the following section(s): LOEL = lowest-observed-effect level, NOAEL = no observed-adverse-effect level, NOEL = no-observed-effect level.
Repeat Toxicity Data:
Oral study (51 days, male rat): NOAEL = 1000 mg/kg/day (increase in weight: liver)
Hyaline droplet formation has been observed in male rats exposed to this material. Some hydrocarbons can induce kidney necrosis in male rats due to the accumulation of a chemical-protein complex (hyaline droplet formation). The necrosis and consequent cell regeneration are believed to result in kidney tumorigenesis. Since the protein involved is found predominantly in male rats (and not in humans), necrosis by this mechanism is not predictive of human risk.
Oral study (40-51 days, female rat): NOAEL = 1000 mg/kg/day (increase in weight: liver)
Reproductive Toxicity Data:
NOEL for maternal/paternal fertility = 1000 mg/kg/day (highest concentration tested)
NOEL for developmental toxicity = 1000 mg/kg/day (highest concentration tested)
Mutagenicity/Genotoxicity Data:
Salmonella typhimurium assay (Ames test): negative (+/- activation)
Mouse micronucleus assay: negative (+/- activation)

---

12. ECOLOGICAL INFORMATION
Introduction: This environmental effects summary is written to assist in addressing emergencies created by an accidental spill which might occur during

the shipment of this material, and, in general, it is not meant to address discharges to sanitary sewers or publicly owned treatment works.
Data for this material have been used to estimate its environmental impact. It has the following properties: a moderate potential to affect some aquatic organisms, a moderate potential to affect algal growth, a low potential to affect secondary waste treatment microbial metabolism, a low potential to affect the germination and/or early growth of some plants. The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.
When diluted with a large amount of water, this material released directly or indirectly into the environment is not expected to have a significant impact.
Oxygen Demand Data:
COD: 2.2 g oxygen/g
ThOD: 2.4 g oxygen/g
BOD-5 and BOD-20 were not determined because the aqueous solubility of the test article was below that which is required for these tests.
Definitions for the following section(s): NOEC = no-observed-effect concentration, LOEC = lowest-observed-effect concentration, MATC = maximum acceptable toxicant concentration.
Acute Aquatic Effects Data:
96-h LC-50 (fathead minnow): 33 mg/l, NOEC: 16 mg/l
48-h EC-50 (daphnid): 147.8 mg/l, NOEC: 28.4 mg/l
96-h LC-50 (pill bug): >100 microliter(s)/l (highest concentration tested)
96-h LC-50 (sideswimmer): >100 microliter(s)/l (highest concentration tested)
96-h LC-50 (flatworms): 40 microliter(s)/l, NOEC: 10 microliter(s)/l
96-h LC-50 (aquatic earthworm): 32 microliter(s)/l, NOEC: 10 microliter(s)/l
96-h LC-50 (ramshorn snail): >100 microliter(s)/l (highest concentration tested)
Acute Algal Effects:
72-h EC-50 (Selenastrum capricornutum): 18.4 mg/l, NOEC: 3.28 mg/l
Biodegradation:
A 28-day test for ready biodegradability using unacclimated microorganisms showed 76% degradation of the test article as measured by carbon dioxide evolution.
A 15-day test for inherent biodegradability using unacclimated microorganisms showed 99.5% degradation of the test article as measured by a loss of dissolved organic carbon.
Secondary Waste Water Treatment Effects: 5-hour IC-50: >215 mg/l; NOEC: 21.5 mg/l
7-Day Plant Germination Effects - No-adverse-effect concentration:
Lettuce: 100 microliter(s)/l (only concentration tested)
Radish: 100 microliter(s)/l (only concentration tested)
Ryegrass: 100 microliter(s)/l (only concentration tested)

---

13. DISPOSAL CONSIDERATIONS
Discharge, treatment, or disposal may be subject to national, state, or local laws. Incinerate.

---

14. TRANSPORT INFORMATION
- DOT (USA) Status: not regulated
- Air - International Civil Aviation Organization (ICAO)
- ICAO Status: not regulated
- Sea - International Maritime Dangerous Goods (IMDG)
- IMDG Status: not regulated

---

15. REGULATORY INFORMATION
- This document has been prepared in accordance with the MSDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.
- OSHA Classification: nonhazardous
- California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986): material(s) known to the State to cause cancer: none
- California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986): material(s) known to the State to cause adverse reproductive effects: none
- This document has been prepared in accordance with the MSDS requirements of the WHMIS Controlled Products Regulation.
- WHMIS (Canada) Status: noncontrolled
- WHMIS (Canada) Hazard Classification: not applicable
- Carcinogenicity Classification (components present at 0.1% or more):
- International Agency for Research on Cancer (IARC): not listed
- American Conference of Governmental Industrial Hygienists (ACGIH): not listed
- National Toxicology Program (NTP): not listed
- Occupational Safety and Health Administration (OSHA): not listed
- Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372: none
- SARA (U.S.A.) Sections 311 and 312 hazard classification(s): not applicable
- US Toxic Substances Control Act (TSCA): This product is listed on the TSCA inventory. Any impurities present in this product are exempt from listing.
- Canadian Environmental Protection Act (CEPA) and Domestic Substances List (DSL): This product is listed on the DSL. Any impurities present in this product are exempt from listing.
- European Inventory of Existing Commercial Chemical Substances (EINECS): This product is listed on EINECS. EINECS Number: 2467719
- Australian Inventory of Chemical Substances (AICS) and National Industrial Chemicals Notification and Assessment Scheme (NICNAS): All components of this product are listed on AICS or otherwise comply with NICNAS.
- Japanese Handbook of Existing and New Chemical Substances: All components of this product are listed in the Handbook or have been approved in Japan by new substance notification.

---

16. OTHER INFORMATION
Label Statements:
LOW HAZARD FOR USUAL INDUSTRIAL OR COMMERCIAL HANDLING BY TRAINED PERSONNEL
Get medical attention if symptoms occur.
FIRST AID: In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
CAUTION: FOR MANUFACTURING, PROCESSING OR REPACKING BY TRAINED PERSONNEL

The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

The symbol ">" in the left margin denotes a revision in this section.

COPYRIGHT 1999 BY EASTMAN CHEMICAL COMPANY

Copyright Eastman Chemical Company, 1995 - 1999

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

TEXANOL Ester Alcohol

TEXANOL Ester Alcohol is a slow evaporating, water-insoluble coalescing aid for latex paints. It provides good performance characteristics, such as scrub resistance, color development, and package stability in paints. It is an excellent coalescing aid for emulsion polymers and has excellent hydrolytic stability, allowing it to be used with a wide variety of latex emulsions including high pH acrylics. When added to an emulsion paint, TEXANOL is absorbed by the emulsions polymeric particles, softening them and causing complete fusion when the paint film dries. Since TEXANOL is insoluble in water and therefore not in the water phase, applying the paint over a porous substrate does not result in reduced coalescing efficiency because TEXANOL is not absorbed along with the water.

List of supplemental documents available on this product:

Applications/End Uses Go

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

TEXANOL Ester Alcohol

List of Applications

- Chemical intermediate
- Coalescing aid
- Coatings
- Inks
- Solvents

Back

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

TEXANOL Ester Alcohol
Product Data Sheet

Property[a]	Test[b] Method	Typical Value, Units[c]
Molecular Weight		216.3
Empirical Formula		$C_{12}H_{24}O_3$
Color, Pt-Co		10 max.
Specific Gravity @ 20°C/20°C		0.95
Wt/Vol @ 20°C		0.95 kg/L (7.9 lb/gal)
Solubility, in Water @ 20°C		Insoluble
Solubility, Water in @ 20°C		0.9 wt %
Evaporation Rate, (n-butyl acetate = 1)		0.002
Refractive Index @ 20°C		1.4423
Vapor Pressure		
@ 25°C		0.013 mm Hg
@ 25°C		1.73 Pa
@ 20°C		0.01 mm Hg
@ 20°C		1.33 Pa
Boiling Point @ 760 mm Hg		255-260.5°C
Freezing Point		-50°C (-58°F)
Flash Point, Cleveland Open Cup		120°C (248°F)

[a] *Unless noted otherwise, all tests are run at 23°C (73°F) and 50% relative humidity.*
[b] *Unless noted otherwise, the test method is ASTM.*
[c] *Units are in SI or US customary units.*

Neither Eastman Chemical Company nor its marketing affiliates shall be responsible for the use of this information, or of any product, method, or apparatus mentioned, and you must make your own determination of its suitability and completeness for your own use, for the protection of the environment, and for the health and safety of your employees and purchasers of your products. No warranty is made of the merchantability of fitness of any product, and nothing herein waives any of the Seller's conditions of sale.

6/24/99 2:30:40 PM

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

MATERIAL SAFETY DATA SHEET
100000383/F/USA
Revision Date: 07/23/1999

---

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
Product Name: "TEXANOL" Ester Alcohol
Product Identification Number(s): 23602
Manufacturer/Supplier: Eastman Chemical Company, Kingsport, Tennessee 37662
MSDS Prepared by: Eastman Product Safety and Stewardship, Eastman Chemical Company, Kingsport, TN 37662
For Emergency Health, Safety & Environmental Information, call 800-EASTMAN
For Emergency Transportation Information, call CHEMTREC at 800-424-9300 or call 800-EASTMAN
For Other Information, call your Eastman representative or the Eastman operator at 423-229-2000 (USA)
Chemical Name: 2,2,4-trimethyl-1,3-pentanediol mono(2-methylpropanoate)
Synonym(s): 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate, EAN 000701
Molecular Formula: $C_{12}H_{24}O_3$
Molecular Weight: 216.32
Product Use: coalescing agent for emulsions

---

2. COMPOSITION/INFORMATION ON INGREDIENTS (Typical composition is given and
it may vary. A certificate of analysis can be provided.)
Weight % - Component - (CAS Registry Number)
100 2,2,4-trimethyl-1,3-pentanediol monoisobutyrate (025265-77-4)

---

3. HAZARDS IDENTIFICATION
LOW HAZARD FOR USUAL INDUSTRIAL OR COMMERCIAL HANDLING BY TRAINED PERSONNEL
HMIS Hazard Ratings: Health - 1, Flammability - 1, Chemical Reactivity - 0
NFPA Hazard Ratings: Health - 1, Flammability - 1, Instability - 0
NOTE: HMIS and NFPA ratings involve data and interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

---

4. FIRST-AID MEASURES
Inhalation: If symptomatic, move to fresh air. Get medical attention if symptoms persist.
Eyes: Any material that contacts the eye should be washed out immediately with water. If easy to do, remove contact lenses. Get medical attention if symptoms persist.
Skin: Wash with soap and water. Get medical attention if symptoms occur.
Ingestion: Seek medical advice.

---

5. FIRE FIGHTING MEASURES
Extinguishing Media: water spray, dry chemical, carbon dioxide (CO_2), foam
Special Fire-Fighting Procedures: Wear self-contained breathing apparatus and

protective clothing.
Hazardous Combustion Products: carbon dioxide, carbon monoxide
Unusual Fire and Explosion Hazards: none

---

6. ACCIDENTAL RELEASE MEASURES
Absorb spill with vermiculite or other inert material, then place in a container for chemical waste.
For Large Spills: Flush spill area with water spray. Prevent runoff from entering drains, sewers, or streams.

---

7. HANDLING AND STORAGE
Personal Precautionary Measures: No special precautionary measures should be needed under anticipated conditions of use.
Prevention of Fire and Explosion: Keep from contact with oxidizing materials.
Storage: Keep container closed.

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Exposure Limits:
ACGIH Threshold Limit Value (TLV): not established
OSHA (USA) Permissible Exposure Limit (PEL, 1989 Table Z-1-A values or section-specific standards): not established
Ventilation: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. Supplementary local exhaust ventilation, closed systems, or respiratory protection may be needed in special circumstances such as poorly ventilated spaces, evaporation from large surfaces, spraying, heating, etc.
Respiratory Protection: If engineering controls do not maintain airborne concentrations to an acceptable level, an approved respirator must be worn. Respirator type: mist, organic vapor. If respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998.
Eye Protection: It is a good industrial hygiene practice to minimize eye contact.
Skin Protection: It is a good industrial hygiene practice to minimize skin contact.
Recommended Decontamination Facilities: eye bath, washing facilities

---

9. PHYSICAL AND CHEMICAL PROPERTIES
- Physical Form: liquid
- Color: colorless
- Odor: mild
- Odor Threshold: not available
- Specific Gravity at 20°C (68°F) (water = 1): 0.95
- Vapor Pressure at 20°C (68°F): 0.013 mbar (0.010 mm Hg)
- Vapor Pressure at 25°C (77°F): 0.017 mbar (0.013 mm Hg)
- Vapor Density (Air = 1): 7.5
- Evaporation Rate (n-butyl acetate = 1): 0.002
- Boiling Point: 255-260.5°C (491-500°F)
- Melting Point: -50°C (-58°F)
- Viscosity at 20°C (68°F): 13.5 mPa.s or cP
- Solubility in Water at 20°C (68°F): 500-860 mg/l
- pH: not available
- Octanol/Water Partition Coefficient: log P = 3.47, P = 2951
- Flash Point (Cleveland open cup): 120°C (248°F)
- Lower Flammable Limit at 149°C (300°F): 0.62 volume %
- Upper Flammable Limit at 201°C (394°F): 4.24 volume %

- Autoignition Temperature (ASTM D-2155): 393°C (740°F)
- Sensitivity to Mechanical Impact: insensitive at 100 kg-cm
- Sensitivity to Static Discharge: Material is unlikely to accumulate a static charge which could act as an ignition source.

---

10. STABILITY AND REACTIVITY
Stability: stable
Incompatibility: Material can react with strong oxidizing agents.
Hazardous Polymerization: will not occur

---

11. TOXICOLOGICAL INFORMATION
Effects of Exposure:
Inhalation: Low hazard for usual industrial handling or commercial handling by trained personnel.
Eyes: May cause transient irritation. However, immediate flushing of the eyes with water will minimize any irritative effect.
Skin: Low hazard for usual industrial handling or commercial handling by trained personnel.
Ingestion: Expected to be a low ingestion hazard.
Acute Toxicity Data:
Oral LD-50 (rat): 6.86 ml/kg
Oral LD-50 (male mouse): 1.6-3.2 g/kg
Inhalation LC-50 (rat): >3.55 mg/l/6 hour(s) (highest concentration tested)
Dermal LD-50 (guinea pig): >20 ml/kg (highest dose tested)
Dermal LD-50 (rabbit): >16 ml/kg (highest dose tested)
Skin irritation (guinea pig): slight
Repeated skin application (guinea pig): very slight irritation
Skin sensitization (guinea pig): none
Eye irritation (rabbit, unwashed eyes): slight to moderate
Eye irritation (rabbit, washed eyes): slight
Definitions for the following section(s): LOEL = lowest-observed-effect level, NOAEL = no observed-adverse-effect level, NOEL = no-observed-effect level.
Repeat Toxicity Data:
Oral study (51 days, male rat): NOAEL = 1000 mg/kg/day (increase in weight: liver)
Hyaline droplet formation has been observed in male rats exposed to this material. Some hydrocarbons can induce kidney necrosis in male rats due to the accumulation of a chemical-protein complex (hyaline droplet formation). The necrosis and consequent cell regeneration are believed to result in kidney tumorigenesis. Since the protein involved is found predominantly in male rats (and not in humans), necrosis by this mechanism is not predictive of human risk.
Oral study (40-51 days, female rat): NOAEL = 1000 mg/kg/day (increase in weight: liver)
Reproductive Toxicity Data:
NOEL for maternal/paternal fertility = 1000 mg/kg/day (highest concentration tested)
NOEL for developmental toxicity = 1000 mg/kg/day (highest concentration tested)
Mutagenicity/Genotoxicity Data:
Salmonella typhimurium assay (Ames test): negative (+/- activation)
Mouse micronucleus assay: negative (+/- activation)

---

12. ECOLOGICAL INFORMATION
Introduction: This environmental effects summary is written to assist in addressing emergencies created by an accidental spill which might occur during

the shipment of this material, and, in general, it is not meant to address discharges to sanitary sewers or publicly owned treatment works.
Data for this material have been used to estimate its environmental impact. It has the following properties: a moderate potential to affect some aquatic organisms, a moderate potential to affect algal growth, a low potential to affect secondary waste treatment microbial metabolism, a low potential to affect the germination and/or early growth of some plants. The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.
When diluted with a large amount of water, this material released directly or indirectly into the environment is not expected to have a significant impact.
Oxygen Demand Data:
COD: 2.2 g oxygen/g
ThOD: 2.4 g oxygen/g
BOD-5 and BOD-20 were not determined because the aqueous solubility of the test article was below that which is required for these tests.
Definitions for the following section(s): NOEC = no-observed-effect concentration, LOEC = lowest-observed-effect concentration, MATC = maximum acceptable toxicant concentration.
Acute Aquatic Effects Data:
96-h LC-50 (fathead minnow): 33 mg/l, NOEC: 16 mg/l
48-h EC-50 (daphnid): 147.8 mg/l, NOEC: 28.4 mg/l
96-h LC-50 (pill bug): >100 microliter(s)/l (highest concentration tested)
96-h LC-50 (sideswimmer): >100 microliter(s)/l (highest concentration tested)
96-h LC-50 (flatworms): 40 microliter(s)/l, NOEC: 10 microliter(s)/l
96-h LC-50 (aquatic earthworm): 32 microliter(s)/l, NOEC: 10 microliter(s)/l
96-h LC-50 (ramshorn snail): >100 microliter(s)/l (highest concentration tested)
Acute Algal Effects:
72-h EC-50 (Selenastrum capricornutum): 18.4 mg/l, NOEC: 3.28 mg/l
Biodegradation:
A 28-day test for ready biodegradability using unacclimated microorganisms showed 76% degradation of the test article as measured by carbon dioxide evolution.
A 15-day test for inherent biodegradability using unacclimated microorganisms showed 99.5% degradation of the test article as measured by a loss of dissolved organic carbon.
Secondary Waste Water Treatment Effects: 5-hour IC-50: >215 mg/l; NOEC: 21.5 mg/l
7-Day Plant Germination Effects - No-adverse-effect concentration:
Lettuce: 100 microliter(s)/l (only concentration tested)
Radish: 100 microliter(s)/l (only concentration tested)
Ryegrass: 100 microliter(s)/l (only concentration tested)

---

13. DISPOSAL CONSIDERATIONS
Discharge, treatment, or disposal may be subject to national, state, or local laws. Incinerate.

---

14. TRANSPORT INFORMATION
- DOT (USA) Status: not regulated
- Air - International Civil Aviation Organization (ICAO)
- ICAO Status: not regulated
- Sea - International Maritime Dangerous Goods (IMDG)
- IMDG Status: not regulated

---

15. REGULATORY INFORMATION
- This document has been prepared in accordance with the MSDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.
- OSHA Classification: nonhazardous
- California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986): material(s) known to the State to cause cancer: none
- California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986): material(s) known to the State to cause adverse reproductive effects: none
- This document has been prepared in accordance with the MSDS requirements of the WHMIS Controlled Products Regulation.
- WHMIS (Canada) Status: noncontrolled
- WHMIS (Canada) Hazard Classification: not applicable
- Carcinogenicity Classification (components present at 0.1% or more):
- International Agency for Research on Cancer (IARC): not listed
- American Conference of Governmental Industrial Hygienists (ACGIH): not listed
- National Toxicology Program (NTP): not listed
- Occupational Safety and Health Administration (OSHA): not listed
- Chemical(s) subject to the reporting requirements of Section 313 or Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and 40 CFR Part 372: none
- SARA (U.S.A.) Sections 311 and 312 hazard classification(s): not applicable
- US Toxic Substances Control Act (TSCA): This product is listed on the TSCA inventory. Any impurities present in this product are exempt from listing.
- Canadian Environmental Protection Act (CEPA) and Domestic Substances List (DSL): This product is listed on the DSL. Any impurities present in this product are exempt from listing.
- European Inventory of Existing Commercial Chemical Substances (EINECS): This product is listed on EINECS. EINECS Number: 2467719
- Australian Inventory of Chemical Substances (AICS) and National Industrial Chemicals Notification and Assessment Scheme (NICNAS): All components of this product are listed on AICS or otherwise comply with NICNAS.
- Japanese Handbook of Existing and New Chemical Substances: All components of this product are listed in the Handbook or have been approved in Japan by new substance notification.

---

16. OTHER INFORMATION
Label Statements:
LOW HAZARD FOR USUAL INDUSTRIAL OR COMMERCIAL HANDLING BY TRAINED PERSONNEL
Get medical attention if symptoms occur.
FIRST AID: In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
CAUTION: FOR MANUFACTURING, PROCESSING OR REPACKING BY TRAINED PERSONNEL

The information contained herein is based on current knowledge and experience; no responsibility is accepted that the information is sufficient or correct in all cases. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers and the protection of the environment.

The symbol ">" in the left margin denotes a revision in this section.

COPYRIGHT 1999 BY EASTMAN CHEMICAL COMPANY

Copyright Eastman Chemical Company, 1995 - 1999

Copyright 1999 Eastman Chemical Company. All rights reserved. Please, see our Legal Information.

OSHA Chemical Sampling Information
2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: 2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate

SYNONYM(s): Texanol

IMIS: R291

CAS: 25265-77-4

NIOSH: UF6000000

DESCRIPTION:

MW: 216.32
MP: (-50) deg C
BP: 244 deg C FP: 110 dec C

Exposure Limits

Health Factors

Monitoring

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 03/01/1999

International Chemical Safety Cards

TEXANOL

ICSC: 0629

TEXANOL
2,2,4-Trimethyl-1,3-pentanediol monoisobutyrate
Propionic acid, 2-methyl-, monoester with 2,2,4-trimethyl-1,3-pentanediol
Isobutyric acid ester with 2,2,4-trimethyl-1,3-pentanediol
$C_{12}H_{24}O_3$
Molecular mass: 216.4

CAS # 25265-77-4
RTECS # UF6000000
ICSC # 0629

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible.	NO open flames.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION			
EXPOSURE			
• INHALATION			
• SKIN	Redness.	Protective gloves.	Rinse and then wash skin with water and soap.
• EYES	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place.		

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0629

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

TEXANOL

ICSC: 0629

I M P O	**PHYSICAL STATE; APPEARANCE:** LIQUID. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:**	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its aerosol and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a nuisance-causing concentration of airborne particles can, however, be reached quickly on spraying.

R T A N T D A T A	**OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV not established.	**EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the eyes and the skin. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 244°C Melting point: -50°C Relative density (water = 1): 0.95 Solubility in water, g/100 ml at 18-22°C: 0.09 Vapour pressure, kPa at 25°C: 0.0008 Relative vapour density (air = 1): 7.5	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00 Flash point: 120°C o.c. Auto-ignition temperature: 393°C Explosive limits, vol% in air: 0.6-4.2 Octanol/water partition coefficient as log Pow: 3.47
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms.	

NOTES

ADDITIONAL INFORMATION

ICSC: 0629 **TEXANOL**

© IPCS, CEC, 1993

IMPORTANT LEGAL NOTICE: Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Texanol Ester-Alcohol

(2,2,4-Trimethyl-1,3-pentanediol Monoisobutyrate)

TYPICAL PROPERTIES*

Evaporation rate, n-BuOAc = 1	0.002
Evaporation rate, ether = 1	6,051.0
Viscosity, cP, 8% *RS* 1/2-s NC @ 25 C	1,115
Viscosity, cP, 8% CAB-381-0.5 @ 25 C	Insoluble
Neat viscosity, cP @ 20 C	18.30
Specific gravity @ 20 /20 C	0.950
Weight/volume @ 20 C, lb/gal	7.90
Weight/volume @ 20 C, kg/L	0.95
Flash point, Cleveland Open Cup, F	248
Freezing point, F	-58
Vapor pressure, torr, 20 C	0.01
Vapor pressure, KPa @ 55 C	0.02
Surface tension, dynes/cm @ 20 C	28.9
Boiling range @ 760 torr C	255-260.5
Solubility @ 20 C, wt %, in water	<0.1
Solubility @ 20 C, wt %, water in	0.9
Autoignition temperature, C	393
Refractive index @ 20 C	1.4423
Electrical resistance, megohms	>20
Hansen solubility parameter, total	9.3
Hansen solubility parameter, nonpolar	7.4
Hansen solubility parameter, polar	3.0
Hansen solubility parameter, hydrogen bonding	4.8
Gram molecular weight	216.30

* Notes

- Properties are typical of average lots. Eastman makes no representation that the material in any shipment will conform to the values given. Specifications are available on request.
- KPa vapor pressure values obtained from American Design Institute of Chemical Engineers' Design Institute for Physical Property Data (DIPPR) 801 Database and extrapolated from measured vapor pressure values.
- Electrical resistance was measured by Ransburg paint resistance meter, part no. 7924, model no. 234. Values shown are typical for commercial production. Certain solvents vary in resistivity with age.
- Hansen solubility parameter values estimated by Dr. Charles Hansen shown as $[cal/cm^3]^{1/2}$.

Chemical Sampling Information
Dipropylene Glycol

Chemical Sampling Information - Table of Contents

Field Definitions
Analytical Methods
Health Guidelines

General Description

NAME: Dipropylene Glycol

SYNONYM(s): 1,1'-Oxydi-2-Propanol; 2,2'-Dihydroxydipropyl Ether

IMIS: D348

CAS: 110-98-5

NIOSH: RTECS UB8785000; 66828

DESCRIPTION:

MW: 134.20
MOLFM: C6H14O3

Exposure Limits

Health Factors

Monitoring

PRIMARY SAMPLING/ANALYTICAL METHOD (SLC1):

MEDIA: Charcoal Tube (100/50 mg sections; 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters **MAX F:** 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA In-House File)
CLASS: Not Validated

Chemical Sampling Information - Table of Contents

Revision Date: 06/25/1992

* All Trademarks are the property of their respective owners.

Chemical Sampling Information
Diethylene Glycol

Chemical Sampling Information - Table of Contents

Field Definitions
Analytical Methods
Health Guidelines

General Description

NAME: Diethylene Glycol

IMIS: D609

CAS: 111-46-6

NIOSH: RTECS: ID5950000

DESCRIPTION:

MW: 106.12
DENSITY: 1.118

Exposure Limits

Health Factors

Monitoring

PRIMARY SAMPLING/ANALYTICAL METHOD (SLC1):

MEDIA: OSHA Versatile Sampler (OVS-7) - 13 mm XAD-7 tube (270/140 mg sections, 20/60 mesh) with a Glass Fiber Filter enclosed
ANL SOLVENT: Methanol
MAX V: 60 L **MAX F:** 2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 5523)
CLASS: Partially Validated
NOTE: Ship cold to the laboratory for analysis.

COND: Gas chromatography-FID with a 60 M DB-5 capillary column, 120-160 C; desorbed with 1 mL 5% methanol 95% methylene chloride, desorption efficiency only checked.

◀ Chemical Sampling Information - Table of Contents

Revision Date: 12/26/1996

* **All Trademarks are the property of their respective owners.**

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIETHYLENE GLYCOL

MSDS Number: O8764 --- *Effective Date: 02/25/99*

1. Product Identification

Synonyms: 2,2'-Oxydiethanol; 2,2'-Oxybisethanol; 2,2' Dihydroxydiethyl ether; CELLOSOLVE(R); glycol ether; Glycolethyl ether
CAS No.: 111-46-6
Molecular Weight: 106.14
Chemical Formula: C4H10O3
Product Codes:
J.T. Baker: S856
Mallinckrodt: 4911

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Diethylene Glycol	111-46-6	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION TO SKIN AND EYES.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Low inhalation hazard unless heated because of low vapor pressure.

Ingestion:
Low acute toxicity. Probable lethal dose to humans is 0.5-5 g/kg. Causes nerve depression, liver and kidney lesions and anuria (urination retardation). Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.
Skin Contact:
May be an irritant to skin on prolonged exposure.
Eye Contact:
May be an irritant to eyes and surrounding tissue.
Chronic Exposure:
Liver and kidney lesions and damage.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. Not expected to require first aid measures.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Call a physician if irritation persists.

---

5. Fire Fighting Measures

Fire:
Flash point: 124C (255F) CC
Autoignition temperature: 229C (444F)
Flammable limits in air % by volume:
lel: 1.6; uel: 10.8
Fire is possible at elevated temperatures or by contact with an ignition source.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above.
Fire Extinguishing Media:
Powder, alcohol foam, water spray or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

---

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
AIHA Workplace Environmental Exposure Level (WEEL): Vapor and Aerosol = 50ppm; Aerosol, only = 10mg/m3.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and particulate filter (NIOSH type P95 or R95 filter) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and particulate filter (NIOSH P100 or R100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. Please note that N series filters are not recommended for this material. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Odorless.
Solubility:
Infinitely soluble.
Specific Gravity:
1.18 @ 20C/20C

pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
244 - 245C (471 - 473F)
Melting Point:
-6.5C (21F)
Vapor Density (Air=1):
3.66
Vapor Pressure (mm Hg):
1 @ 91.8C (198F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic gases and vapors may be released if involved in a fire. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong acids and strong bases.
Conditions to Avoid:
Incompatibles.

---

11. Toxicological Information

Oral rat LD50: 12565 mg/kg. Skin rabbit LD50: 11.89 g/kg Irritation: eye rabbit, standard Draize: 50 mg mild. Investigated as a tumorigen and reproductive effector.

```
--------\Cancer Lists\-------------------------------------------------------
                                        ---NTP Carcinogen---
Ingredient                              Known    Anticipated    IARC Category
------------------------------------    -----    -----------    -------------
```

Diethylene Glycol (111-46-6)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Diethylene Glycol (111-46-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Diethylene Glycol (111-46-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.

```
----------------------------------------  ---   -----   ----  --------------
Diethylene Glycol (111-46-6)              No    No      No    Glycol ether

--------\Federal, State & International Regulations - Part 2\----------------
                                                     -RCRA-     -TSCA-
Ingredient                                CERCLA     261.33      8(d)
----------------------------------------  ------     ------     ------
Diethylene Glycol (111-46-6)              No         No          No

Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: No information found.
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 Flammability: 1 Reactivity: 0
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION TO SKIN AND EYES.
Label Precautions:
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their

independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ETHYLENE GLYCOL

MSDS Number: E5125 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: 1,2-Ethanediol; glycol; 1,2-Dihydroxyethane; Ethylene Alcohol; Ethulene Dihydrate
CAS No.: 107-21-1
Molecular Weight: 62.07
Chemical Formula: CH2OHCH2OH
Product Codes: J.T. Baker: 5387, 5574, 5845, 9140, 9298, 9300, 9346, 9349, 9356, L715 Mallinckrodt: 5001, 5037

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ethylene Glycol	107-21-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Vapor inhalation is generally not a problem unless heated or misted. Exposure to vapors over an extended time period has caused throat irritation and headache. May cause nausea, vomiting, dizziness and drowsiness. Pulmonary edema and central nervous system depression may also develop. When heated or misted, has produced rapid, involuntary eye movement and coma.

Ingestion:
Initial symptoms in massive dosage parallel alcohol intoxication, progressing to CNS depression, vomiting, headache, rapid respiratory and heart rate, lowered blood pressure, stupor, collapse, and unconsciousness with convulsions. Death from respiratory arrest or cardiovascular collapse may follow. Lethal dose in humans: 100 ml (3-4 ounces).

Skin Contact:
Minor skin irritation and penetration may occur.

Eye Contact:
Splashes may cause irritation, pain, eye damage.

Chronic Exposure:
Repeated small exposures by any route can cause severe kidney problems. Brain damage may also occur. Skin allergy can develop. May damage the developing fetus.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, or impaired liver, kidney, or respiratory function may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and

upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Give sodium bicarbonate intravenously to treat acidosis. Urinalysis may show low specific gravity, proteinuria, pyuria, cylindruria, hematuria, calcium oxide, and hippuric acid crystals. Ethanol can be used in antidotal treatment but monitor blood glucose when administering ethanol because it can cause hypoglycemia. Consider infusion of a diuretic such as mannitol to help prevent or control brain edema and hemodialysis to remove ethylene glycol from circulation.

---

5. Fire Fighting Measures

Fire:
Flash point: 111C (232F) CC Autoignition temperature: 398C (748F) Flammable limits in air % by volume: lel: 3.2; uel: 15.3 Slight to moderate fire hazard when exposed to heat or flame.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Containers may explode when involved in a fire.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water or foam may cause frothing. Water spray may be used to extinguish surrounding fire and cool exposed containers. Water spray will also reduce fume and irritant gases.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Toxic gases and vapors may be released if involved in a fire.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Separate from acids and oxidizing materials. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 50 ppm Ceiling -ACGIH Threshold Limit Value (TLV): 50 ppm Ceiling (vapor)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and dust/mist filter may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and dust/mist filter may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.

Odor:
Odorless.

Solubility:
Miscible in water.

Specific Gravity:
1.1 @20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
197.6C (388F)

Melting Point:
-13C (9F)

Vapor Density (Air=1):
2.14

Vapor Pressure (mm Hg):
0.06 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. May produce acrid smoke and irritating fumes when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents. Reacts violently with chlorosulfonic acid, oleum, sulfuric acid, perchloric acid. Causes ignition at room temperature with chromium trioxide, potassium permanganate and sodium peroxide; causes ignition at 212F(100C) with ammonium dichromate, silver chlorate, sodium chloride and uranyl nitrate.

Conditions to Avoid:
Heat, flames, ignition sources, water (absorbs readily) and incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 4700 mg/kg; skin rabbit LD50: 9530 mg/kg. Irritation - skin rabbit: 555mg(open), mild; eye rabbit: 500mg/24H, mild. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Ethylene Glycol (107-21-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to evaporate significantly. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. When released into water, this material is not expected to evaporate significantly. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Ethylene Glycol (107-21-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Ethylene Glycol (107-21-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Ethylene Glycol (107-21-1)	No	No	Yes	No

```
--------\Federal, State & International Regulations - Part 2\----------------
                                                        -RCRA-    -TSCA-
Ingredient                                  CERCLA      261.33     8(d)
----------------------------------------  ------      ------    ------
Ethylene Glycol (107-21-1)                  5000        No         No

Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 **Flammability:** 1 **Reactivity:** 0

Label Hazard Warning:
WARNING! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN REACTION. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

Label Precautions:
Do not breathe vapor or mist. Use only with adequate ventilation. Keep container closed. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists. If swallowed, give water or milk to drink and induce vomiting. Never give anything by mouth to an unconscious person. In all cases call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR

IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ETHYLENE GLYCOL**

CAS Number: 107-21-1
DOT Number: None

RTK Substance number: 0878
Date: February 1989 Revision: June 1996

HAZARD SUMMARY

* **Ethylene Glycol** can affect you when breathed in and by passing through your skin.
* **Ethylene Glycol** should be handled as a TERATOGEN--WITH EXTREME CAUTION.
* **Ethylene Glycol** can irritate the eyes, nose and throat.
* Exposure can cause a "drunk" feeling, nausea, vomiting, and headache.
* Repeated or high exposure may cause kidney and brain damage.

IDENTIFICATION

Ethylene Glycol is a colorless, odorless, syrupy liquid. It is used as anti-freeze in heating and cooling systems, to de-ice aircraft wings, as an industrial solvent, and in paint and plastics.

REASON FOR CITATION

* **Ethylene Glycol** is on the Hazardous Substance List because it is cited by ACGIH, NFPA, NIOSH, DEP, HHAG and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

PEOSHA: The legal airborne permissible exposure limit (PEL) is **50 ppm** not to be exceeded at any time.

NIOSH: The recommended airborne exposure limit is **50 ppm**, which should not be exceeded at any time.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Ethylene Glycol** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Ethylene Glycol** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Ethylene Glycol**:

* Exposure can cause a "drunk" feeling, nausea, vomiting, and headache.
* **Ethylene Glycol** can irritate the eyes, nose and throat.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Ethylene Glycol** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Ethylene Glycol** has been tested and has not been shown to cause cancer in animals.

Reproductive Hazard

* **Ethylene Glycol** may be a TERATOGEN in humans since it has been shown to be a teratogen in animals.
* **Ethylene Glycol** may damage the developing fetus.

Other Long-Term Effects

* Repeated or high exposure may cause kidney and brain damage.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* Kidney function test.
* Exam of nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **Ethylene Glycol** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Ethylene Glycol** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Ethylene Glycol**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* On skin contact with **Ethylene Glycol**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Ethylene Glycol**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Ethylene Glycol** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Ethylene Glycol**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **50 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Ethylene Glycol** you should be trained on its proper handling and storage.
* **Ethylene Glycol** must be stored to avoid contact with STRONG BASES, ACIDS, OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) since violent reactions occur.
* Store in tightly closed containers in a cool, well-ventilated area.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Should I be concerned if a chemical is a teratogen in animals?

A: Yes. Although some chemicals may affect humans differently than they affect animals, damage to animals suggests that similar damage can occur in humans.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **ETHYLENE GLYCOL**
DOT Number: **None**
NAERG Code: **No Citation**
CAS Number: **107-21-1**

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	1
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Ethylene Glycol** is a COMBUSTIBLE LIQUID.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use dry chemical, CO_2, water spray, or alcohol foam extinguishers.
* Use water spray to keep fire-exposed containers cool.
* Vapors may travel to a source of ignition and flash back.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Ethylene Glycol** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Keep **Ethylene Glycol** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Ethylene Glycol** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0.06 mm Hg at 68°F (20°C)
Flash Point: 232°F (111°C)
Water Solubility: Miscible

OTHER COMMONLY USED NAMES

Chemical Name:
1,2-Ethanediol
Other Names:
Glycol Alcohol; Glycol; Fridex

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Ethylene Glycol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Ethylene Glycol

SYNONYM(s): Ethylene Glycol, Particulate prior to 9/1/89; Ethylene Glycol, Vapor prior to 9/1/89

IMIS: 1911

CAS: 107-21-1

NIOSH: RTECS KW2975000; 35569

DESCRIPTION:

Liquid.

Exposure Limits

THRESHOLD LIMIT VALUE: 100 mg/m3 Ceiling Aerosol; Appendix A4 (Not Classifiable as a Human Carcinogen)

RECOMMENDED EXPOSURE LIMIT: 50 ppm Ceiling

Health Factors

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Moderate (HE15) CNS depression (HE7)

Monitoring

SLC1:

MEDIA: OSHA Versatile Sampler (OVS-7) - 13 mm XAD-7 tube (270/140 mg sections, 20/60 mesh) with a Glass Fiber Filter enclosed
ANL SOLVENT: Methanol
MAX V: 60 L **MAX F:** 2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 5523)
CLASS: Partially Validated
NOTE: Ship cold to the laboratory for analysis.

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 12/08/1998

NIOSH Pocket Guide to Chemical Hazards

Ethylene glycol	**CAS** 107-21-1
$HOCH_2CH_2OH$	**RTECS** KW2975000
Synonyms & Trade Names 1,2-Dihydroxyethane; 1,2-Ethanediol; Glycol; Glycol alcohol; Monoethylene glycol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D	
	OSHA PEL†: none	
IDLH N.D. See: IDLH INDEX	**Conversion**	

Physical Description
Clear, colorless, syrupy, odorless liquid. [antifreeze] [Note: A solid below 9°F.]

MW: 62.1	BP: 388°F	FRZ: 9°F	Sol: Miscible
VP: 0.06 mmHg	IP: ?		Sp.Gr: 1.11
Fl.P: 232°F	UEL: 15.3%	LEL: 3.2%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, chromium trioxide, potassium permanganate, sodium peroxide [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Method
OSHA versatile sampler-7; Methanol; Gas chromatography/Flame ionization detection; IV [#5523] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; nausea, vomiting, abdominal pain, weakness; dizziness, stupor, convulsions, central nervous system depressant/depression; skin sensitization

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0270

EPA United States Environmental Protection Agency
Office of Air Quality Planning & Standards OAQPS
TTNWeb Technology Transfer Network
UATW Unified Air Toxics Website

ETHYLENE GLYCOL

107-21-1

Hazard Summary

- Acute (short-term) exposure of humans to ethylene glycol by ingesting large quantities causes three stages of health effects. **Central nervous system (CNS) depression**, including such symptoms as vomiting, drowsiness, coma, respiratory failure, and convulsions, is followed by **cardiopulmonary effects**, and later **renal damage**.
- No effects were noted in one study of individuals exposed to low levels of ethylene glycol by inhalation for about a month. Rats and mice chronically (long-term) exposed to ethylene glycol in their diet exhibited signs of **kidney toxicity** and liver effects. Ocular irritation and lesions and pulmonary inflammation have been observed in rats, rabbits, and guinea pigs subchronically exposed by inhalation.
- The U.S. Environmental Protection Agency (EPA) has not established a Reference Concentration (RfC) for ethylene glycol.
- The Reference Dose (RfD) for ethylene glycol is 2.0 mg/kg/d.[a] EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, noncancer effects.[b]
- No information is available on the reproductive or developmental effects of ethylene glycol in humans. Several studies of rodents exposed orally, by gavage (experimentally placing the chemical in the stomach), or by inhalation showed ethylene glycol to be **fetotoxic**.
- No information is available on the carcinogenic effects of ethylene glycol in humans. Oral exposure of rats and mice was not associated with an increased incidence of tumors. EPA has classified ethylene glycol as a Group D, **not classifiable as to human carcinogenicity**.

---

[a] Milligrams per kilogram per day is one way to measure the amount of the contaminant that is consumed in food.

[b] The RfD is not a direct estimator of risk but rather a reference point to gauge the potential effects. Exceedance of the RfD does not imply that an adverse health effect would necessarily occur. As the amount and frequency of exposures exceeding the RfD increase, the probability of adverse health effects also increases. Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS), which contains information on oral chronic toxicity and the RfD, and the carcinogenic effects of ethylene glycol, and EPA's *Health Effects Assessment for Ethylene Glycol* . Other secondary sources include the Hazardous Substances Data Bank (HSDB), a database of summaries of peer-reviewed literature, and the Registry of Toxic Effects of Chemical Substances (RTECS), a database of toxic effects that are not peer reviewed.

Environmental/Occupational Exposure

- Dermal or inhalation exposure to workers may occur during the manufacture or use of the chemical. (1)
- Ethylene glycol may be discharged into wastewater from its production and use. It may also

enter the environment from its uses in deicing airplane runways and from spills and improper disposal of used antifreeze, coolant, and solvents containing ethylene glycol. (1,2)

Assessing Personal Exposure

- Urinalysis for oxalic acid, an ethylene glycol metabolite, may be useful in diagnosis of poisoning by oral exposure. (3)

Health Hazard Information

Acute Effects:

- Acute (short-term) exposure of humans to ethylene glycol by ingesting large quantities causes three stages of health effects. CNS depression, including such symptoms as vomiting, drowsiness, coma, respiratory failure, and convulsions, is followed by cardiopulmonary effects and later renal damage. (4,5)
- Acute animal tests, such as the LC_{50} and LD_{50} tests in rats, mice, rabbits, and guinea pigs, have demonstrated ethylene glycol to have moderate acute toxicity by inhalation or dermal exposure and low to moderate acute toxicity by ingestion. (6)

Chronic Effects (Noncancer):

- No effects were noted in one study of individuals exposed to low levels of ethylene glycol by inhalation for about a month. (5)
- Rats and mice chronically (long-term) exposed to ethylene glycol in their diet exhibited signs of kidney toxicity and liver effects. (5,7)
- Ocular irritation and lesions and pulmonary inflammation have been observed in rats, rabbits, and guinea pigs subchronically exposed by inhalation. (5)
- EPA has not established an RfC for ethylene glycol. (7)
- The RfD for ethylene glycol is 2.0 mg/kg/d based on kidney toxicity in rats. (7)
- EPA has high confidence in the study on which the RfD was based because it was a well-conducted lifetime study by a relevant route and defined a no-observed-adverse-effect level (NOAEL) and lowest-observed-adverse-effect level (LOAEL); high confidence in the database because it contains another chronic rat study and a monkey study that support the NOAEL and LOAEL and it also contains data that indicate that the RfD is protective of teratogenic and reproductive effects; and, consequently, high confidence in the RfD. (7)
- EPA's Office of Air Quality Planning and Standards, for a hazard ranking under Section 112(g) of the Clean Air Act Amendments, has evaluated ethylene glycol for chronic toxicity and has given it a composite score of 10 (scores range from 1 to 100, with 100 being the most toxic). These scores are nonlinear and are the product of two ratings: a rating based on the minimal-effect-dose and a rating based on the type of effect. (8)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of ethylene glycol in humans.
- Several studies of rodents exposed orally, by gavage (experimentally placing the chemical in the stomach), or by inhalation showed ethylene glycol to affect animal fetuses. Fetotoxicity manifested as increased preimplantation loss, delayed ossification, and an increased incidence of fetal malformations were reported. The inhalation study, however, noted continuous grooming of the fur, resulting in a high rate of exposure by ingestion as well. (5,7)

Cancer Risk:

- No information is available on the carcinogenic effects of ethylene glycol in humans. (5)
- Oral exposure of rats and mice was not associated with an increased incidence of tumors. (5)
- EPA has classified ethylene glycol as a Group D, not classifiable as to human carcinogenicity. (5)

Physical Properties

- The chemical formula for ethylene glycol is $C_2H_6O_2$, and its molecular weight is 62.07 g/mol. (4)
- Ethylene glycol occurs as a clear, slightly viscous liquid that is completely miscible with water. (1,4,5)
- Ethylene glycol is odorless. (3)
- The vapor pressure for ethylene glycol is 0.06 mm Hg at 20 C, and its log octanol/water partition coefficient (log K_{ow}) is -1.36. (5)

Uses

- Ethylene glycol is used as antifreeze in cooling and heating systems, in hydraulic brake fluids, as an industrial humectant, as an ingredient of electrolytic condensers, as a solvent in the paint and plastics industries, in the formulations of printers' inks, stamp pad inks, and inks for ballpoint pens, as a softening agent for cellophane, and in the synthesis of safety explosives, plasticizers, synthetic fibers (Terylene, Dacron), and synthetic waxes. (4)

Conversion Factors:
To convert from ppm to mg/m^3: mg/m^3 = (ppm) × (molecular weight of the compound)/(24.45). For ethylene glycol: 1 ppm = 2.54 mg/m^3.

Health Data from Inhalation Exposure

Concentration (mg/m^3)	Health numbers[a]	Regulatory, advisory numbers[b]	Reference
1,000,000.0			
-- -- -- -- 100,000.0			
-- -- -- -- 10,000.0	• LC_{50} (rats) (10,876 mg/m^3)		6
--			

-- -- -- 1,000.0			
-- -- -- -- 100.0		• ACGIH TLV and OSHA PEL (125 mg/m^3)	6
-- -- -- -- 10.0		• MSHA standard (10 mg/m^3)	6

ACGIH TLV--American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.
LC_{50} (Lethal Concentration$_{50}$)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.
MSHA--Mine Safety and Health Administration.
OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

[a] Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.
[b] Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice.

References

1. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Library of Medicine, National Toxicology Information Program, Bethesda, MD. 1993.
2. U.S. Environmental Protection Agency. *Ethylene Glycol Health Advisory* . Office of Drinking Water, Washington, DC. 1987.
3. M. Sittig. *Handbook of Toxic and Hazardous Chemicals and Carcinogens* . 2nd ed. Noyes Publications, Park Ridge, NJ. 1985.
4. *The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals* . 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.
5. U.S. Environmental Protection Agency. *Health Effects Assessment for Ethylene Glycol* . EPA/600/8-88/038. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1988.
6. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
7. U.S. Environmental Protection Agency. *Integrated Risk Information System (IRIS) on Ethylene Glycol* . Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1993.
8. U.S. Environmental Protection Agency. *Technical Background Document to Support Rulemaking Pursuant to the Clean Air Act--Section 112(g). Ranking of Pollutants with Respect to Hazard to Human Health* . EPA-450/3-92-010. Emissions Standards Division, Office of

Bernard K. Zysman
Technical Service Specialist
Specialty Products

OxyChem®

Occidental Chemical Corporation
Specialty Business Group
53rd Street and Buffalo Avenue
Niagara Falls, NY 14303
716/278-7894 1-800/733-1165 FAX: 716/278-7297
Internet Address: bernie_zysman@oxy.com

June 14, 1999

Naveen Berry
South Coast AQMD
21865 E. Copley Drive
Diamond Bar, CA 91765

Dear Mr. Berry:

It was a pleasure talking with you in Durham, NC, about the activities in the coatings rules in the AQMD. As I indicted, enclosed is the literature that is either new or updated since January, 1999 which summarizes the available technical data in paint and coatings applications. Only the last item on the list is not new, but was requested.

Description	Document Number
OXSOL 100 Physical Properties and Regulatory Summary	BCG-OX-26 03/99
OXSOL 100 Parachlorobenzotrifluoride (PCBTF) Toxicology Summary	BCG-OX-65 3/99
OXSOL 100 Reduced VOC Starter Paint Formulations	BCG-OX-24 6/99
Putting Solvent Back in Paint Legally -Reprint from *Metal Finishing*	BCG-OX-65 4/99
Solvent Slide Rule	
Formulating High-Performance Epoxy Coatings with Parachlorobenzotrifluoride and Acetone, copy of C. Hare article from *Paint and Coatings Industry*, January, 1999	
p-Chlorobenzotrifluoride Health and Environmental Effects Study	BCG-OX-46 11/96

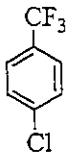
If you have any additional questions or would like a sample, please contact me by phone at 716-278-7894 or e-mail Bernie_Zysman@oxy.com

Sincerely,

Bernard K. Zysman
Technical Service Specialist
SCAQMD061199bkz

Enclosures

Occidental Chemical Corporation
P.O. Box 344, Niagara Falls, NY 14302-0344
1-800-733-1165 • Fax: 716-278-7297



OXSOL® 100
Physical Properties and Regulatory Summary

OXSOL 100, a purified grade of parachlorobenzotrifluoride (PCBTF), is a clear water-white liquid with a napthalenic odor. PCBTF has been commercially produced since the early 1960's. OXSOL 100 is exempt from VOC regulations, is not a Hazardous Air Pollutant (HAP) and not an Ozone Depleting Substance (ODS). It is a stable, non-corrosive compound.

This chemical can eliminate or reduce the use and emissions of VOCs without giving up the many benefits received from organic solvents. It can be used to extend or replace many organic solvents, including, but not limited to: toluene, xylene, mineral spirits, acetone, methyl ethyl ketone (MEK), trichloroethylene, perchloroethylene, 1,1,1-trichloroethane and n-methyl pyrrolidone (NMP).

OXSOL 100 can be used in paints and coatings, maskants, adhesives, sealants, inks and cleaning applications such as wipe, dip, spray and aerosol cleaners for metal, precision, electric and electronic articles. It can also be used as a chemical intermediate.

REGULATORY

Clean Air Act (CAA)
- VOC exempt: 40CFR51.100(s)
- Not listed as Hazardous Air Pollutant (HAP): CAA Sec. 112(b)
- Not Ozone Depleting Substance (ODS): SNAP approved as acceptable substitute for ODS in solvent cleaning, aerosols, adhesives, coatings and inks; Fed. Reg., May 22, 1996, pp. 25585-25594

Clean Water Act (CWA)
- Not listed as hazardous substance: 40CFR 116
- Not listed as Toxic Priority Pollutant (TPP): 40CFR 401.15

Resource Conservation and Recovery Act (RCRA)
- Not listed as substance or source waste: 40CFR 261.31, 32, or 33
- Classified as EPA Hazardous Waste Number D001: 40CFR 261.21

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Not on Hazardous Substance list: 40CFR 302.4

Superfund Amendments and Reauthorization Act (SARA)
- Not on Extremely Hazardous Substance (EHS) list: 40CFR 355
- Not on Toxic Chemical List (SARA reporting not required): 40CFR 372
- MSDS reporting required if facility stores ≥ 10,000 lb.: Sec. 311-312

Toxic Substance Control Act (TSCA)
- All components are listed on TSCA Inventory: TSCA Sec. 8(b)
- Export notification not required: TSCA Sec. 12(b)

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Not approved as active or inert ingredient in pesticide formulations

Department of Transportation (DOT)
- Not regulated
- Definition for Class 3: 49CFR 173.120
- Exception for Class 3: 49CFR 173.150

Occupational Health and Safety Administration (OSHA)
- Hazard Communication: 29CFR 1910.1200
- Combustible liquid: 29CFR 1910.106
- OxyChem's Corporate Exposure Limit (CEL) 8 hr. TWA: 25 ppm
- PEL and TLV not established by ACGIH or OSHA

Food and Drug Administration (FDA)
- Not approved as ingredient for food use

California Prop 65
- Not listed

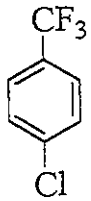
Canada
- WHMIS hazard class: B3
- Not listed on DSL; listed on NDSL
- Application for DSL accepted on 9/29/97

CHEMICAL AND PHYSICAL PROPERTIES

CAS#	98-56-6
Molecular Weight	180.56
Boiling Point	138.6°C (281.5°F)
Freezing Point	-36.0°C (-32.8°F)
Density @25°C	11.2 lb./gal
Specific Gravity @25/15.5°C	1.3380
Sp. Gr. Correction Factor	-0.00146°C
Refractive Index @25°C	1.4444
Vapor Density (air=1)	6.2
Evapor. Rate @25°C (n-BuAc=1.0)	0.9
Saturated Vapor Con. @25°C	10,400 ppm
Vapor Pressure @25°C	7.9 mm Hg
Vapor Pressure @20°C	5.3 mm Hg
Specific Heat Capacity	0.27cal/gm/°C (BTU/lb./°F)
Heat of Vaporization	49.6 cal/gm (1000 BTU/gal)
Flash Point (TCC)	109°F (42.8°C)
Fire Point (TOC)	207°F (97.2°C)
Upper Flammability Limit (vol.)	10.5%
Lower Flammability Limit (vol.)	0.9%
Limited Oxygen Index (LOI)	26.2%
Heat of Combustion	7700 BTU/lb. (1.8×10^7 J/kg)
Viscosity @25°C	0.79 cp
Surface Tension @25°C	25 dynes/cm
Solubility of Solvent in Water @23°C	29 ppm
Solubility of Water in Solvent @25°C	240 ppm
Hansen Solubility Parameter, Total	8.6 $(cal/cm^3)^{1/2}$
Polar	4.8 $(cal/cm^3)^{1/2}$
Hydrogen Bonding	2.3 $(cal/cm^3)^{1/2}$
Non-Polar	6.8 $(cal/cm^3)^{1/2}$
Kauri Butanol Value	64
Dielectric Breakdown	49 kv
Henry's Law Const. (est.)	3.47×10^{-2} atm-m³/mol
Octanol-Water Partition Coefficient	
Log Kow (measured)	3.70
Bioconcentration Factor (BCF)	
Log BCF (measured)	2.09 - 2.30
Odor Threshold	0.1 ppm (0.8 mg/m³)

Occidental Chemical Corporation
Specialty Business Group
Occidental Tower
5005 LBJ Freeway
Dallas, Texas 75244
800/752-5151

IMPORTANT: The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. No warranty or guarantee, express or implied, is made regarding performance, stability or otherwise. This information is not intended to be all-inclusive as the manner and conditions of use, handling, storage and other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State or local laws.



OXSOL® 100
Parachlorobenzotrifluoride
(PCBTF)
Toxicology Summary

PCBTF is intended for use in industrial solvent cleaning, aerosols, adhesives, coatings, inks, and for other similar uses. Under use conditions, the major routes of exposure are considered to be through the skin and by inhalation. Using laboratory test information for acute (immediate) toxicity, PCBTF is estimated to be practically non-toxic through skin contact or swallowing , and is estimated to be slightly toxic if breathed at high levels. PCBTF is slightly irritating to the eyes and barely irritating to the skin. If inhaled or ingested, PCBTF is largely eliminated through breathing, with small amounts being changed in the body to products that dissolve in water.

Since PCBTF will be used in many different ways and will be used by people on a day to day basis for a number of years, some tests have been done to see if it might cause any problems over a period of time. Some studies that were done include tests to see if PCBTF might cause mutations in cells. Mutations are important because if a chemical causes mutations in cells, it could have an effect on fertility (ability to have children), birth defects, hereditary diseases (diseases passed from parent to child), and cancers. It is important to know that even if a chemical does cause mutations, that does not necessarily mean that it will cause these problems. It is just one tool that scientists use to help identify if a chemical might be a problem to human health. Based on the results from these short-term tests, PCBTF is not expected to cause mutations in mammals. In addition, PCBTF was subjected to a number of studies that looked at the effects of ingesting or inhaling PCBTF daily for an extended period of time. These tests are used to help identify problems that might occur in workers using PCBTF on a daily basis. The results of these studies showed that PCBTF did not have an effect on the nervous system of the animals when they inhaled PCBTF at a concentration 100 times greater than is recommended for a worker. Additionally, PCBTF is not considered a reproductive hazard based on a study in which the animals ingested this chemical for a long period of time.

Both ingestion and inhalation of PCBTF produced effects on the liver and kidney of the test animals. The kidney effects were found only in the male rat and it was further found that these effects are not relevant to man. The liver effects resulted in increased size and weight. It is important to know that the liver is the main organ that helps to eliminate chemicals from the body. So, it is not unusual for a chemical to have an effect on the liver. The effects that were seen, are most likely adaptive responses of the liver to PCBTF. However, because of these effects Occidental Chemical Corporation has established a Corporate Exposure Limit (CEL) of 25 parts-per-million (ppm). This is a Time Weighted Average (TWA) exposure limit, meaning that a worker can be safely exposed to an average airborne concentration of 25 ppm for 8 hours per day. PCBTF has excellent warning properties. It has an odor threshold about 100 times lower than the CEL. This means that you will smell it at a level well below the CEL so that action can be taken to reduce the exposure.

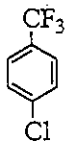
When using PCBTF, it is important that you read and understand the guidelines and recommendations outlined by the Material Safety Data Sheet (MSDS).

Call 1-800-733-1165 for further product information.
The OxyChem **24-hour emergency number is 800-733-3665 or 972-404-3228**

BCG-OX-66 3/99

Occidental Chemical Corporation
Specialty Business Group
Occidental Tower
5005 LBJ Freeway
Dallas, Texas 75244
800/752-5151

IMPORTANT: The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. No warranty or guarantee, express or implied, is made regarding performance, stability or otherwise. This information is not intended to be all-inclusive as the manner and conditions of use, handling, storage and other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State or local laws.



OXSOL® 100
Reduced VOC Starter Paint Formulations

The formulations in this technical bulletin are being supplied to aid the paint formulator with a starting point to develop coatings for specific applications which comply with the Clean Air Act Amendments of 1990. OXSOL 100, a VOC exempt chemical, can be used in a variety of solvent based industrial coating formulations as a replacement for a number of organic solvents. In these formulations, the use of OXSOL 100 had very little, if any, effect on the wet paint or the dry film properties of the coatings.

For additional information on the OXSOL solvents and their applications in protective coatings, please contact OxyChem Technical Service at 800-733-1165 (EST).

Index

Formulation	Page
Epoxy Polyamide MIL-P-24441 (Formula 150 Green Primer)	2
Epoxy Polyamide Red Primer	3
Epoxy Polyamide Red Gloss Finish	4
Epoxy Polyamide Aluminum Pigmented Coating	5
Epoxy Polyamide Non-Leafing Aluminized Mastic	6
Epoxy Polyamide Stainless Steel Pigmented Glass Flake Modified Coating	7
Epoxy Polyamide Stainless Steel Pigmented Coating	8
Urethane Polyester Polyol Corrosion Inhibitive Semi Gloss Coating	9
Hydroxylated Acrylic Urethane Gloss White Coating	10
Urethane Zinc Rich Moisture Cured Coating	11
Siliconized Polyester Coil Coating	12
Long Oil Alkyd Corrosion Inhibitive Coating (Federal TT-P-645)	13
Vinyl Toluene Acrylate Clear Lacquer Concrete Sealer	14
Rosin Modified Nitrocellulose Lacquer	15
Vinyl Resin Coating	16

OXSOL® is a Registered Trademark of Occidental Chemical Corporation

BCG-OX-24 6/99

Occidental Chemical Corporation
Specialty Business Group
Occidental Tower
5005 LBJ Freeway
Dallas, Texas 75244
800/752-5151

IMPORTANT: The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. No warranty or guarantee, express or implied, is made regarding performance, stability or otherwise. This information is not intended to be all-inclusive as the manner and conditions of use, handling, storage and other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State or local laws.

Epoxy Polyamide Red Primer

Ingredients	Manufacturers	Pounds	Gallons
Part A			
Epon 828	Shell	222.5	22.94
MPA-1078	Elementis	3.8	0.52
Mix well,			
Then add at high speed			
TiPure R-900	Du Pont	23.8	0.72
10 AS Wollastocoat	NYCO	352.3	14.56
Grind at 125°F to 5 n.s.u			
Reduce speed and add			
Super Hi-Flash Naphtha		39.0	5.37
Xylene		42.8	5.74
Total Part A		**684.2**	**49.85**
Part B			
Ancamide 2353X	Air Products	122.4	14.49
MPA-1078	Elementis	3.8	0.52
Beetle 216-8	Cytec	14.3	1.64
Mix well, at high speed add			
Red Iron Oxide 206M	Laporte Pigments	57.1	1.37
Beaverwhite 325	Cyprus	92.0	4.00
Phosplus J-0866	Laporte Pigments	134.6	4.84
Grind at 125°F to 5 n.s.u			
Reduce speed then add			
OXSOL 100	OxyChem	121.7	10.87
Diacetone Alcohol		29.8	3.80
Super Hi-Flash Naphtha		62.6	8.62
Total Part B		**638.3**	**50.15**
Total (Parts A and B)		**1322.5**	**100.00**

Properties	
Non Volatile, wt. %	76.8
vol. %	64.1
PVC, %	40
CPVC, %	50
VOC, g/l	248
lb./gal.	2.1
Mixing Ratio	1:1
Density, lb./gal.	13.2
Viscosity, cp	2500
Pot Life, hr.	3
Dry to Touch, hr.	1
Dry Through, hr.	6

Produced at Clive H. Hare Inc., Lakeville, MA

Epoxy Polyamide Aluminum Pigmented Coating

Ingredients	Manufacturers	Pounds	Gallons
Part A			
L-2848 Aluminum Paste	Silberline	128.8	8.99
Super Hi-Flash Naphtha		76.0	10.45
Premix and allow to stand for 24 hrs, then add			
Epodil L	Air Products	30.0	3.45
Epon 828	Shell	263.0	27.11
Mix well until uniform			
Total Part A		**497.8**	**50.00**

Part B			
Ancamide 2050	Air Products	223.0	26.55
Beetle 216-8	Cytec	25.7	2.95
Diacetone Alcohol		17.0	2.17
OXSOL 100	OxyChem	170.9	15.26
Super Hi-Flash Naphtha		22.3	3.07
Total Part B		**458.9**	**50.00**

Total (Parts A and B)		**956.7**	**100.00**

Properties	
Non Volatile, wt. %	66.0
vol. %	63.0
PVC, %	6.9
CPVC, %	27.3
VOC, g/l	225
lb./gal.	1.9
Mixing Ratio	1:1
Density, lb./gal.	9.6

Produced at Clive H. Hare Inc., Lakeville, MA

Epoxy Polyamide Stainless Steel Pigmented Glass Flake Modified Coating

Ingredients	Manufacturers	Pounds	Gallons
Part A			
Epodil 759	Air Products	62.5	8.43
Araldite 6010	Ciba-Geigy	356.8	36.79
Cabosil TS-610	Cabot	3.6	0.21
Disperse at high speed			
Stainless Steel Paste	Novamet	180.8	5.75
Total Part A		**603.7**	**51.18**

Part B			
Flake Glass Untreated	Nyco	63.3	3.01
10% Modaflow in Aromatic 100	Monsanto	18.1	2.46
Ancamide 2426	Air Products	198.9	25.11
Cabosil TS-610	Cabot	5.0	0.28
Aromatic 100		54.2	7.45
OXSOL 100	OxyChem	66.0	5.89
Diacetone Alcohol		36.2	4.62
Total Part B		**441.7**	**48.82**

Total (Parts A and B)		**1045.4**	**100.00**

Properties	
Non Volatile, wt. %	81.6
vol. %	77.0
PVC, %	8.4
CPVC, %	98.6
VOC, g/l	149
lb./gal.	1.3
Mixing Ratio	1:1
Density, lb./gal.	10.5
Initial Viscosity, cp	784
Pot Life, hr.	8
Dry to touch, hr.	8
Dry hard, hr.	22

Produced at Clive H. Hare Inc., Lakeville, MA

Urethane Polyester Polyol Corrosion Inhibitive Semi Gloss Coating

Ingredients	Manufacturers	Pounds	Gallons
Part A			
Desmophen 670-A-80	Bayer	229.9	24.99
Desmophen 631-75	Bayer	30.7	3.32
BYK 204	BYK-Chemie	1.2	0.16
BYK 320	BYK-Chemie	1.2	0.17
MPA-1078	Elementis	2.4	0.32
MP-44-26	Specialty Minerals	90.3	3.86
Imsil A-8	Unimin	106.7	4.91
Halox SZP-391	Halox	54.1	2.15
TiPure R-960	Du Pont	108.3	3.35
Barytes BB-250	Elementis	93.8	2.56
21.8% CAB Sol in MIBK	Eastman	21.8	3.04
OXSOL 100	OxyChem	62.8	5.80
Methyl Amyl Ketone (MAK)		165.5	24.26
Acetone		57.0	8.62
Total Part A		**1025.7**	**87.51**
Part B			
Desmodur N3300	Bayer	122.7	12.49
Total Part B		**122.7**	**12.49**
Total (Parts A and B)		**1148.4**	**100.00**

Properties	
Non Volatile, wt. %	68.8
vol. %	51.2
PVC, %	33.0
CPVC, %	56.0
VOC, g/l	344
lb./gal.	2.9
Mixing Ratio	7:1
Density, lb./gal.	11.5
Viscosity, cp	241

Produced at Clive H. Hare Inc., Lakeville, MA

Urethane Zinc Rich Moisture Cured Coating

Ingredients	Manufacturers	Pounds	Gallons
Airthane PCG-475A	Air Products	230.9	25.20
Dislon 30	King	28.5	3.90
Super Hi-Flash Naphtha		47.5	6.53
Zinc Dust UP6	Purity	2232.7	38.36
pTSMI	Vanchem	15.1	1.40
Super Hi-Flash Naphtha		80.7	11.11
Cabosil TS-720	Davison	19.0	1.20
Additive OF	Bayer	19.0	2.53
OXSOL 100	OxyChem	107.0	9.58
Dabco 120	Air Products	1.6	0.19
Total		**2782.0**	**100.00**

Properties	
Non Volatile, wt. %	89.1
vol. %	63.6
PVC, %	62.2
CPVC, %	61.9
Pigment Content, %	80.9
VOC, g/l	258
lb./gal.	2.2
Density, lb./gal.	27.8

Produced at Clive H. Hare Inc., Lakeville, MA

Long Oil Alkyd Corrosion Inhibitive Coating (Federal TT-P-645)

Ingredients	Manufacturers	Pounds	Gallons
Aroplaz 1266-M-70	Reichhold	383.3	47.90
Busperse 47	Buckman	3.9	0.52
TiPure R-900	Du Pont	102.2	3.07
MP-44 26	Specialty Minerals	106.0	4.55
Halox SZP-391	Halox	103.4	4.12
Halox CW-2230	Halox	51.3	2.36
Sicotan L-1012	BASF	194.3	5.78
Mineral Spirits		137.2	21.11
Nuxtra LTD 18%	Huls	1.1	0.12
Manganese Hex-Cem 6%	Mooney	0.7	0.10
OXSOL 100	OxyChem	109.2	9.75
Cobalt Chem-All 12%	Mooney	0.2	0.02
Cabosil TS 720	Cabot	9.0	0.60
Total		**1201.7**	**100.00**

Properties	
Non Volatile, wt. %	69.8
vol. %	51.3
PVC, %	39.9
CPVC, %	51.5
VOC, g/l	335
lb./gal.	2.8
Density, lb./gal.	12.0

Produced at Clive H. Hare Inc., Lakeville, MA

Rosin Modified Nitrocellulose Lacquer

Ingredients	Manufacturers	Pounds	Gallons
ParCell Nitrocellulose		92.8	8.72
Poly-Pale	Hercules	32.8	3.68
SAIB (sucrose acetate isobutyrate)	Eastman	32.8	3.44
DINP (diisononyl phthalate)	Exxon	32.8	4.00
Acetone		392.0	58.88
Ethyl 3-ethoxypropionate	Eastman	46.4	5.84
OXSOL 100	OxyChem	166.4	14.88
1% SF-69 silicone in acetone	General Electric	4.0	0.56
Total		**800.0**	**100.00**

Properties	
Non Volatile, wt. %	69.8
vol. %	51.3
PVC, %	39.9
CPVC, %	51.5
VOC, g/l	335
lb./gal.	2.8
Density, lb./gal.	8.0

From *Hercules ParCell Nitrocellulose for Low-VOC Lacquers*, CTG-DD-153A, Hercules Corporation.

Putting Solvent Back in Paint Legally

by Lawrence Clark[a], Stephen Kaldon[a], Edwin Reid[a], and David Ellicks[b]

[a]NCI Information Systems Inc., Warner Robins, Ga., and [b]U.S. Air Force Corrosion Program Office, Robins AFB, Warner Robins, Ga.

The 1990 Clean Air Act Amendments (CAAAs) have been responsible for reducing the emissions of volatile organic compounds (VOCs), ozone depleting substances (ODSs), and hazardous air pollutants (HAPs). Painting operations in the aerospace industry have been a major source of emissions and are now regulated under the Aerospace National Emissions Standards for Hazardous Air Pollutants (NESHAP). The emphasis to reduce VOCs, ODSs, and HAPs has been placed on paint manufacturers and they have responded successfully by developing new paint formulations. While ODSs are all but eliminated, solvents used in paints continue to be the primary source of VOCs and HAPs generated in painting operations. The currently compliant paint formulations now contain much less solvent than previous formulations. A companion effort for reducing emissions has been technology improvements in painting equipment to increase the transfer efficiency of paint application. These emission reduction efforts have hurt the painter's ability to apply quality coating systems. This article addresses these issues and explains the efforts by the Air Force and Navy to legally put solvents back into paint to help their painters and painting processes.

Paints utilized throughout the aerospace industry are considered high performance, and their application process has always been critical to that performance. The impact of reducing solvent levels in paints has had a number of effects. The high-solids coatings with reduced solvents have proven to be much more susceptible to surface contamination; even small amounts cause a variety of defects and holidays in the paint as well as adhesion failures. The old solvent-rich paint formulations were not as sensitive because the additional solvent in the paint would break down and dissolve many contaminants not completely removed during surface preparation. Consequently, the surface preparation for painting has become a much more labor-intensive and unforgiving process. While original equipment manufacturers (OEMs) are affected, the impact is greater on repair and overhaul operations. The repair and overhaul operations must deal with aircraft and their components that have been contaminated by different soils, lubricants, and other materials that have leached into every crack and crevice. The new coatings have presented other problems to the painter and painting operations as well.

High-solids epoxy and polyurethane coatings impose inherent problems on the application process as a result of reduced solvent content. These paints normally do not have a viscosity as low as desired by painters after mixing. Furthermore, these paints are restricted from being diluted with solvent by the painter as this would increase the VOC content past regulated levels. The high-solids paints are also more sensitive to environmental factors of temperature and humidity in shops where these extremes cannot be controlled. The high-volume low-pressure (HVLP) paint guns required by the NESHAP offer good transfer efficiency but are not so good at laying down a wet film due to the high viscosity of the paint. Combine temperature and humidity problems, HVLP paint guns, and too high viscosity and the result is painters have great difficulty achieving a wet, smooth, good-looking finish. Additionally, if the painter compensates and applies the paint too thick in order to obtain a good finish, solvent pop (small pin holes in the paint film resulting from the solvent evolving out of the paint) is likely to occur. The application of thicker-than-necessary paint films also causes the cure time of the paint to increase significantly. For all of the above reasons the painting process at many maintenance and overhaul facilities has become more difficult and less forgiving. The Air Force Corrosion Program Office has been working to improve the environmental compliance in painting operations as well as to improve the painting process. Finding a legal way to put solvent back into paint would go a long way to resolve the problems we've just discussed.

EPA EXEMPT SOLVENTS

In late 1994 and early 1995 the EPA revised the definition of VOCs for two solvents that are of interest to painters: parachlorobenzotrifluoride (PCBTF) and acetone. The EPA ruling deleted PCBTF (see Fig. 1) and acetone from the definition of VOCs. Combined with other law, summarized in Table I, the use of PCBTF and acetone is essentially unre-

Formulating High-Performance Epoxy Coatings with

Parachlorobenzotrifluoride

and Acetone

by Clive H. Hare / Coating System Design Inc., Lakeville, MA

Over the last 10 or 15 years, marked changes in formulating techniques for high-performance epoxy maintenance coatings have occurred. They have been primarily directed at compliance, with the tightening of the volatile organic compound (VOC) regulations that limit the amount of short-term, photochemically active solvent permitted in these compositions. Epoxy coatings respond quite well to reformulation for low VOCs. The downside effects on the application and mechanical properties of these films, however, are sometimes overlooked. Until now, options for compliance have been limited to the use of lower-molecular-weight (MW) monomeric precursors, such as liquid epoxy resins and curing agents. These resins produce lower-viscosity systems requiring less solvent carrier. With the introduction of exempt solvents having slower environmental reactivity profiles (parachlorobenzotrifluoride [PCBTF][1]) and the granting of exemptions by the Environmental Protection Agency (EPA) to other solvents (acetone[2]), new avenues have been enabled toward achieving the same low-VOC ends. These avenues require less of a departure from epoxy-coating formulation, and give films with mechanical and application properties similar to traditionally characterized epoxy systems.

This article reviews both formulation techniques, the high-solids, low-VOC approach using liquid resins and low-viscosity curing agents with traditional solvent systems, and the low-solids, low-VOC approach using traditional resin systems with nontraditional, VOC-exempt solvents. The importance of solvent selection in both systems and the value that the use of PCBTF brings to this type of formulation are also discussed.

solutions of solid, medium-MW epoxies. These resins, with epoxy equivalent weights (EEW) of 450 to 525, were cured with a variety of reactive polyamides and polyamines, including amine adducts, polyoxyalkylene amines, and other moderately high-MW curing agents. These materials were carried in solvent systems based on mixtures of aromatics, alcohols, ketones and glycol ethers. Volume solids of the resultant compositions ranged from 40% to 60%, and initial mixed viscosities were normally in the range of 100 to 500 cps. Pot lives were long, at 12 to 24 hours or more (the epoxy primer noted in Table I is applicable 24 hours after mixing).

The films, which were often applied by conventional spray techniques, without further reduction, dried rapidly to give an initial lacquer dry phase that preceded the slower development of full cure. This allowed easy handling and permitted short recoat times. The cure would advance satisfactorily beneath subsequently applied films as long as the epoxies were carefully mixed and temperatures remained appropriate for cure. The VOC of these films ranged from 350 to 600 g/L.

This type of system, exemplified most universally by rather conventional epoxy/polyamide systems and applied in films of 1 to 4 mils/coat in two or three coat applications, displayed a well-balanced blend of properties, including adhesion and corrosion resistance. Where extra chemical resistance was required, the polyamide might be augmented or replaced with the amine or amine adducts noted above.

High-Solids Coatings from Liquid Resins

The use of specialty systems formulated at 100% solids and based on lower-MW liquid epoxy monomers (the diglycidyl ether of bisphenol A, having an EEW of 188) predated many, if not all, of the mandated VOC controls. The use of these liquid epoxy resins did not become commonplace in mainstream, epoxy maintenance coatings, however, until the early 1980s.

As the demand for coatings of 350, 250 and even lower VOCs increased, formulators inevitably fell back on the use of the liquid epoxies as the primary vehicle for new coating systems. The resins were crosslinked with a growing variety of proprietary curing agents, including low-MW amides, amidoamines and imidazolines; modified cycloaliphatic amines; Mannich bases; and amine adducts of various types. Many of these curing agents were themselves modified with low-MW moieties such as benzyl alcohol, a nonreactive (though cure accelerating) material that appeared to have great affinity for epoxy system, and partially, if not largely, remained in the film as a nonvolatile component after curing.

Other devices, such as nonreactive plasticizers (hydrocarbon resins), and monofunctional and difunctional epoxy diluents, including Epoxide 7, glycidyl neodecanate, hexane diol diglycidyl ether, were used to further reduce viscosity with minimal impact on VOC. Lower-MW bisphenol F resins were often used with and without bisphenol A-type epoxy modifications. Even more radical techniques were introduced in the form of low-MW bisphenol A epoxies modified with di- and tri-functional acrylic resins (hexane diol diacrylate and trimethylolpropane triacrylate). These systems formed complex, multiphase reactions with selected amines (Michael Addition of the primary amine to the acrylic double bonds followed by a subsequent reaction of the secondary amine terminated adduct with the epoxy resin), and gave very low viscosities.

All of these approaches were successful in reducing VOCs. At levels of 200 to 300 g/L, viable systems were possible with initial application viscosities of 500 to 1,500 cps and volume solids of 80% that could be applied (certainly by airless spray) with only limited compromise in aesthetics. The flow and leveling properties of the high-solids, epoxy coatings are often slightly poorer than films from the more conventional compositions. Film build, sag resistance and flow of the high-solids compositions are generally controlled with selective additives. Good balance between the rheological force favoring film build and the surface tension force that favors flow is often more difficult to control with additives than it is using solvent blends to achieve balance, as was done with the traditional epoxy systems. Potlives of the liquid, lower-MW, epoxy-based coatings are much shorter, 4 to 8 hours, compared with 12 to 24 hours for traditional systems.

ly. Without a solvent, dissipation of the heat of reaction is much reduced and the exotherm buildup stimulates polymeric advancement in the can, thereby shortening the potlife exponentially. On the other hand, in the applied film, the exotherm is readily dissipated so that there is no thermally induced advancement. Thus, the drying of films from high-solids systems lags behind cure in the can; quite the contrary to the situation that occurs in the traditional, lower-solids systems. Attempts to advance the cure in the high-solids film can only further shorten potlife. Without a lacquer dry phase, applicators of fast-drying systems must either cope with extremely short potlives or rely on plural component spray equipment.

Ketimine and the Effects of Solvent Selection

The chemical control of cure kinetics, such as with ketimine cure hindrance shown in Figure 1, is popular with high-solids systems, but might bring associated problems. While ketimine curing agents are prepared and marketed as raw materials for coatings, ketimine formation more often results from the formulation process itself, as a result of placing amine curing agents and ketones in the same package.

In both cases, prior to the introduction of the epoxy, the active amine is temporarily tied up by reaction with a ketone producing the ketimine. This reaction must be reversed before the dissociated amine can subsequently react with the epoxy. This reverse reaction is induced by water, which frees up the amine and allows the reformed ketone to evaporate. While water is not substantially available to material in the can before application, it is supplied by the air to the drying film during and after application. Thus, although potlife is prolonged, drying is much less delayed.

Theoretically viable, this approach unfortunately has its own shortcomings, for cure time now depends on the humidity during and after application and solvent release, which might vary from one application to another. In systems requiring induction (as many of the low-MW epoxy/amine-based formulations do), the required induction might be inconstant and difficult to judge. Where humidity is sufficient to dissociate the ketone, induction time requirements are much shorter than is the case where relative humidities are lower. Induction is often crucial with this type of system to avoid the potential for the stratification of low-MW amine fragments or ketimines on the film surface where they might react with components of the atmosphere, such as CO_2 and water. This phenomena leads to amine blush and the formation of amine carbamate (see Figure 2). The danger of insufficient induction and amine blush is not only the disfigurement and discoloration of the film (see Figure 3), but, in severe circumstances, adhesion problems wherein the blush might be so marginal as to be invisible yet sufficient to act as interference material between the epoxy and any finish coat that might be applied to it (see Figure 4).

Ketimine inhibition of cure is also noted with diacetone alcohol. Whether this is related to the addition of the amine directly to the carbonyl of the solvent, or a result of the liberation of acetone in the presence of the amine and the consequent formation of the ketimine, is not known to the author. Any acceleration of cure from the alcohol is apparently overridden. Alcohols, unlike ketones, tend to increase reaction rates and shorten potlife, such as the effects with benzyl alcohol noted earlier.

The effects of alcoholic moieties are generally felt more with the liquid epoxy systems, which are not them-

Figure 2 / Formation of Carbamate Salt from Reaction of Amine with Water and Carbon Dioxide

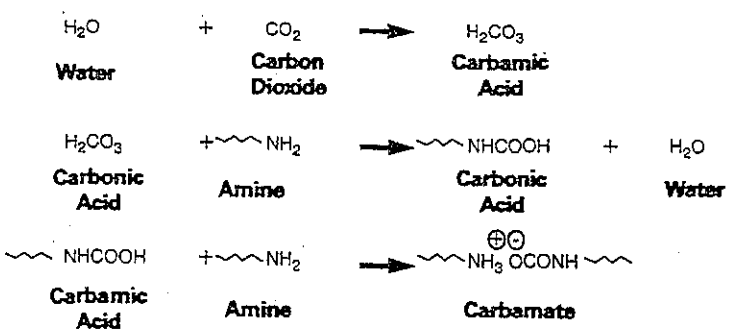
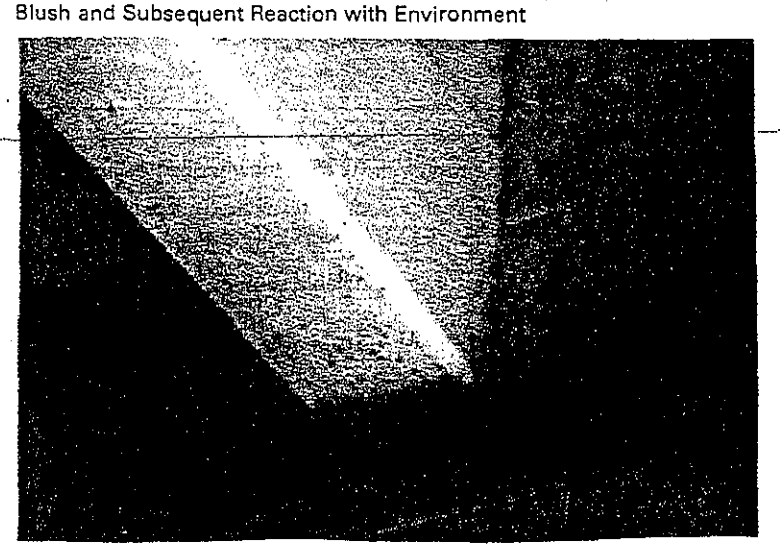


Figure 3 / Yellow Disfigurement of an Epoxy Coating Caused by Amine Blush and Subsequent Reaction with Environment



MIL-P-23377 formulation discussed previously and illustrates the use of PCBTF in this type of composition. MIL-P-23377 is an aircraft primer, and film flexibility is of paramount concern if stress demands from service are to be accommodated. The aircraft industry has resisted the use of the high-Tg, high-crosslink-density primers based on liquid epoxies in these applications because of the generally reduced flexibilities of these systems and the higher internal stress buildup on cure. Additionally, minimization of wet film thickness is often more difficult to control using these heavier materials. Because of the high-volume solids, control of dry film thickness is rendered even more difficult than is the case with the lower-solid systems, as more dry paint is deposited from the same wet film thickness. Too high a dry-film thickness tends to introduce internal stress into the system, as well as adding unwanted weight to the aircraft. The application of low-build coatings from high-solids, low-VOC systems is difficult. Thus, in spite of the demands for low VOC, the engineering requirements of coating system design have sustained the use of the traditional, low-solids, high-VOC, Type II epoxies in this application.

Some concerns in the same industry have arisen from the use of chlorinated solvents on light, metal structures. Before its phaseout, the initially exempt solvent 1,1,1-trichloroethane was recognized as a potential device for reducing VOCs without significant changes in the composition of the solid film. The experience with straight-chained chlorinated solvents, such as 1,1,1-trichloroethane, was, however, clouded by the instability of the solvent and its predilection to induce HCl attack on the aluminum. This effectively rendered this approach untenable in the aircraft industry.

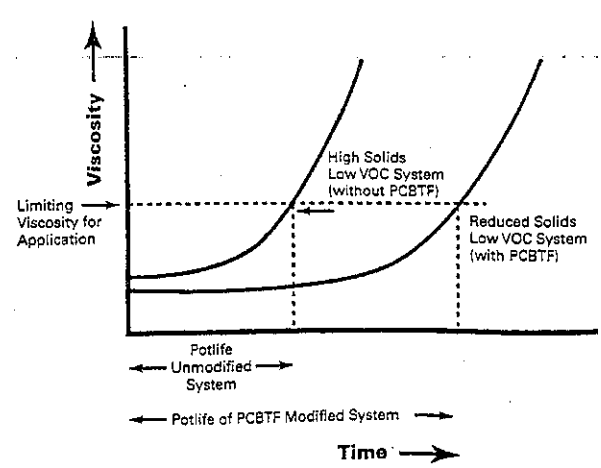
1,1,1-trichloroethane is subject to the mutual abstraction of chlorine and hydrogen atoms from adjacent carbons on the backbone of the solvent molecule, a phenomena that is catalyzed by heat, light and contact with certain metals. The product of this dehydrochlorination reaction, hydrochloric acid, has the potential to attack aluminum substrates, inducing stress corrosion cracking. The possibilities of such attack gave considerable concern in the aircraft industry, because of safety considerations. Parachlorobenzotrifluoride, unlike 1,1,1-trichloroethane, is not subject to dehydrochlorination and will not degrade.[1] Stabilization in the form of additives, as was attempted with 1,1,1-trichloroethane, is not necessary with PCBTF. This concern should, therefore, be moot, and the use of PCBTF in aircraft primers (see Table 1) fulfills the requirement for a non-VOC reducer that might facilitate easy application of these primers (MIL-P-23377) in films of easily controlled thickness.

Exempt Solvent Systems in Low-VOC Epoxy Formulations

PCBTF has considerable value in the formulation of low-VOC, liquid, epoxy-based compositions, as well as the solid epoxies. It is not difficult to formulate this type of system with conventional solvents at and below 250 g/L VOC. However, even with the use of nonvolatile viscosity depressants, such as reactive and nonreactive diluents initial viscosities of the mixed material range from 500 to 1,500 cps and potlives are quite short. Where induction times are required, the application window might be very short. Applications are often borderline, especially using conventional spray techniques and flow and leveling properties are left marginal. The use of 5% to 10% additions of an exempt solvent system will often provide sufficient flow to give the required leveling and aesthetics, facilitate application and extending potlife. As the PCBTF additions are increased active groups are dispersed, reactivity is reduced and exotherms are dissipated, all of which results in a flattened viscosity time curve (see Figure 5) that reflects the extension of potlife. It is important to note that both acetone and parachlorobenzotrifluoride are true and excellent solvents for all low-MW epoxy resins and most of their curing agents.

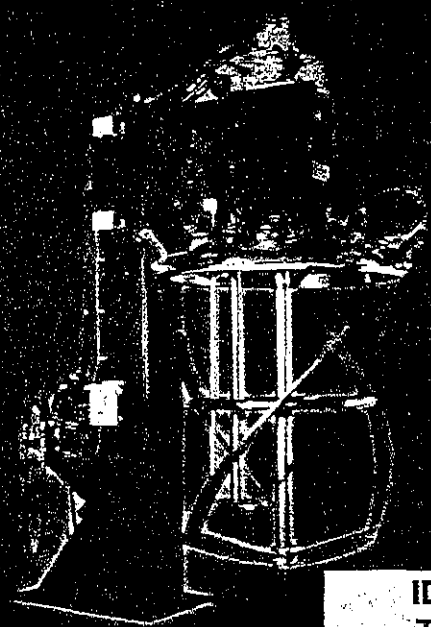
Acetone, which is lower in cost than PCBTF, can also be employed where the extreme flammability of this solvent does not preclude its use. Unfortunately, in confined areas, which are often encountered particularly in the painting of ship interiors and tanks, high flash point is a primary requirement[2] and the use of acetone is, therefore, inappropriate. Although the low-boiling acetone is a somewhat better viscosity reducer than PCBTF, its excessive evaporation rate does less to improve flow and leveling. Where acetone can be used, it is often nec-

Figure 5 / Effect of PCBTF Reduction at Constant VOC on Epoxy Potlife



the mid-boiling aromatic diluent, xylene, without the xylene's red-label flashpoint. PCBTF might also often replace MIBK, although this could require other adjustments to the solvent system in the Type II epoxy-based systems. Where lower flashpoint can be tolerated, acetone may be effectively used to replace the faster drying HAPS solvents, such as MEK and toluene.

DUAL-SHAFT HELICAL-BLADE MIXER



- Patented helical-blade agitator improves product turnover
- Helps eliminate hot or cold spots in the batch
- Greater control of viscosity, particle size, and color
- Shorter batch times, increased throughput, and lower processing cost
- Standard sizes from 100 to 2,000 gallons
- Engineered for your specific application

IDEAL FOR MEDIUM- TO HIGH-VISCOSITY OR HARD-TO-MIX PRODUCTS

For a detailed quotation, contact your local Reynolds Industries representative or call us direct at 803-548-4301

Reynolds Industries Inc.

Manufacturers of process equipment since 1976
3601 Foothills Way • Fort Mill, South Carolina 29715
Telephone 803-548-4301 • Fax 803-548-1365

CIRCLE NO. 32

Conclusion

New understandings of solvent structure effects on the rates of atmospheric reactivity have encouraged a more reasoned approach to VOC control. The reclassification of existing solvents and the introduction of new materials that have rates of atmospheric degeneration slow enough to cause minimal effect on ground-level ozone generation, yet not so slow as to cause ozone depletion in the high atmosphere provide valuable new avenues for the formulation of compliant coatings. This article addressed only the opportunities that such changes have brought to epoxy formulation; similar, parallel or alternative opportunities are equally realizable with other coating types.

Editor's note: This complete article, including Tables 2 and 3, is available on **PCI**'s website at www.pcimag.com.

For more information on solvents, contact Clive Hare, Coating System Design Inc., 121 Crooked Lane, Lakeville, MA 02347; call 508/946.4611; fax 508/946.0988; or **Circle Number 69.**

References

[1] Hare, C.H. Parachlorobenzotrifluoride – An environmentally friendly solvent. *Modern Paint and Coatings*, **1998**, No. 1, 30.

[2] The Solvent Council. Using VOC-Exempt Solvents to Formulate Compliant Coatings. *Modern Paint and Coatings*, **1996**, No. 4, 22.

[3] Hare, C.H. Epoxy Systems, Chapter 15, p. 187. *Protective Coatings – Fundamentals of Chemistry and Composition*, Technology Publishing Co., Pittsburgh, **1994**.

[4] Walker, F. Introduction to Polymers and Resins. 2nd Edition, Federation Series on Coatings Technology, FSCT, Blue Bell, PA, **1999**.

[5] Dubowik, D. Guidelines for Formulating Epoxy Amine Systems, *Paint and Coatings Industry*, **1998**, No. 10, 86.

p-CHLOROBENZOTRIFLUORIDE

Health and Environmental Effects Summary

PCBTF is intended for use in industrial solvent cleaning, aerosols, adhesives, coatings, inks, and for other similar uses. Under use conditions, the major routes of exposure are considered to be through the skin and by inhalation. The estimated rat oral LD_{50} value is greater than 6.8 g/kg, while its acute dermal toxicity (LD_{50}) is greater than 2.7 g/kg in the rabbit. The acute inhalation toxicity (LC_{50}) is 4479 ppm. PCBTF is slightly irritating to the eyes and barely irritating to the skin.

Inhaled or ingested PCBTF is largely eliminated per se by exhalation (88%) with small amounts (8%) being metabolized to water soluble hydroxylated products (3-hydroxy PCBTF and 2,3 dihydroxy PCBTF) and conjugates. The only health effects relevant to humans observed in a rat 90-day inhalation toxicity and neurobehavioral study were a dose related increase in hepatocyte hypertrophy accompanied by an increase in mean liver weights, liver/body weight ratios, blood plasma protein, alanine aminotransferase (SGPT) and an induction in liver CYP-1A2 activity. The NOEL for these effects was determined to be 50 ppm (approx 40 mg/kg). PCBTF was not neurotoxic at concentrations as high as 250 ppm for 90 days. No hepatocyte hypertrophy was observed in livers of rats exposed to 250 ppm after a 90-day recovery period. PCBTF is not considered to be a reproductive hazard as demonstrated by the results of a modified 90-day subchronic oral toxicity and reproduction study at dose levels as high as 45 mg/kg. In this study F_0 male and female rats were orally administered PCBTF 4 weeks prior to mating and through the mating, gestation and lactation periods. Selected twenty-one day old F_1 rats received the same treatment as their parents and continued for at least 90 days. Longer pre-mating exposures (10 weeks) are currently required in two generation reproduction studies.

An in vitro and in vivo battery of tests (Ames test-reverse mutation assay in bacteria and yeast (PCBTF and urinary metabolites), mouse lymphoma forward mutation assay (TK locus in L5178Y cells), sister-chromatid exchange in mouse lymphoma L5178Y cells (SCE), in vitro chromosome aberration study (CHO), in vivo bone marrow chromosome aberration study, mouse BALB/3T3 transformation assay, and DNA repair assay (UDS in EUE cells) were performed to identify genotoxicity and to predict mutagenic or oncogenic potency of the PCBTF. Of the tests performed, negative results were obtained in all except the sister chromatid exchange study and the DNA repair assay. The in vitro and in vivo chromosome aberration studies were performed to determine the significance of the positive SCE

Occidental Chemical Corporation
Specialty Business Group
Occidental Tower
5005 LBJ Freeway
Dallas, Texas 75244
800/752-5151

IMPORTANT: The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. No warranty or guarantee, express or implied, is made regarding performance, stability or otherwise. This information is not intended to be all-inclusive as the manner and conditions of use, handling, storage and other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as, a recommendation to infringe any existing patents or to violate any Federal, State or local laws.

MAMMALIAN TOXICOLOGY

ACUTE STUDIES

Oral toxicity. The oral LD_{50} value was attained by gavaging 8 male and 8 female Sprague-Dawley rats with PCBTF. The LD_{50} was determined to be greater than 5 ml/kg (6.65 g/kg) Clinical signs included tremors in all rats on day one of observation and ataxia and loss of righting reflex in half of the rats on the first day of observation. Histopathology was not remarkable (2).

Dermal toxicity. Five male and five female New Zealand white rabbits received a dermal application of PCBTF on abraded skin. The LD_{50} was determined to be greater than 2.7 g/kg. Clinical signs were not noted and histopathology was not remarkable (2).

Inhalation toxicity. The LC_{50} value was 4479 ppm and was determined by exposing 5 groups of 5 male/5 female Sprague-Dawley rats for 4 hours to air concentrations of 0, 818, 2822, 3853, 5304, or 9048 ppm PCBTF. Histopathologic examination revealed mottled, light and dark-red lungs in all rats, and livers with dark-red, gray and purple blotches in rats exposed to 2822 ppm and greater air concentrations. Clinical signs observed over the 14-day post-exposure period included: body tremors, hypersensitivity to sound stimuli, and hyperactivity in surviving animals (9048 ppm); aggressive behavior, uncoordinated movement, and alopecia (5304 ppm). The effects observed were prostration and body tremors in the 2822 ppm group during and shortly after exposure. The NOAEL for clinical signs of neurotoxicity in this study was 818 ppm (3).

The 2 hr, LC_{50} value for rats reported in a study from the Soviet Union was 2985 ppm. The LOAEL for adverse central nervous system effects was approximately 112 ppm and the NOAEL for this study was 53.6 ppm (4).

On the basis of the results of these inhalation studies a 90-day (13-week) inhalation toxicity and neurobehavioral study was performed. The results of the 90-day study and a 28-day inhalation range finding study are reported in the subchronic studies section.

Eye irritation. PCBTF was applied to the eyes of New Zealand white rabbits in 0.1 ml doses to determine primary eye irritation. The irritation score for washed eyes was 0 (no irritation). The score for unwashed eyes was 2 (slight irritation) but decreased to 0 after 72 hours (5).

Dermal irritation. PCBTF was applied to the abraded and intact skin of New Zealand white rabbits in 0.5 ml doses to determine primary skin irritation. The irritation scores after 72 hours were 0.3 and 0.2 (barely irritating) for abraded and intact skin, respectively (5). Additionally, a skin chloracne test was performed using New Zealand white rabbits. PCBTF did not produce any signs of chloracne after 24 repeated applications (6).

mg/kg PCBTF for 90 days. F_1 rats not used for the 90-day study were necropsied after weaning. All F_1 rats used in the study were necropsied at 90 days. No adverse clinical signs were noted in the F_0 and F_1 rats during the study. Additionally, feed consumption, blood chemistry, gestation period, and litter survivability were all within normal limits. The only toxicological finding of importance was that of increased liver weights and increased liver to body weight ratios in all F_1 treated animals when compared to the controls. While this finding was not statistically significant, a dose-response relationship was noted and therefore the finding should be considered biologically significant (11).

90-Day gavage study. The toxicity of PCBTF to Fisher 344 rats was determined in a subchronic, 90-day gavage study at dose levels of 10, 40, 150 and 500 mg/kg. Significant signs of toxicity were observed in both male and female rats at the doses of 150 and 500 mg/kg. Statistically significant decreased body weight gain occurred in males at the high dose. Statistically significant elevations of blood urea nitrogen were observed in males at 150 and 500 mg/kg and total bilirubin was significantly increased in male and female rats at the high dose. Mild proteinuria occurred in high dose males and 150 and 500 mg/kg dose female rats. Statistically significant, dose-related increases in liver weights were observed in males beginning at a dose level of 40 mg/kg. The mean liver weight was significantly increased in female rats at doses of 150 and 500 mg/kg. Kidney weights were significantly increased in male and female animals at doses of 150 and 500 mg/kg. Histopathological examination showed renal tubular degeneration in all males beginning at a dose level of 40 mg/kg. The severity of the renal lesions increased with the dose. Centrilobular hepatocyte hypertrophy was observed in all male rats at doses of 150 and 500 mg/kg and in all female rats at the high dose level. Ignoring signs of male specific kidney damage at 40 mg/kg, the NOAEL for this study is 40 mg/kg (12).

28-Day inhalation study. A 28-day, subacute inhalation study was conducted with PCBTF in Sprague-Dawley rats (10 animals/sex/group) at dose levels of 100, 250, 500 and 1000 ppm. Exposure was for 6 hr/day, 5 days/week. Clinical observations demonstrated a dose related increase in animal activity beginning at a dose level of 250 ppm. Body tremors were observed in all females and 2/10 male rats at the high dose level by the end of the study. Absolute kidney weights and kidney/body weight ratios were significantly elevated in females at doses of 250 ppm and higher. Kidney/body weight ratios were significantly increased in male rats at doses of 250 ppm and above. Male kidney changes were considered to be due to alpha 2U globulin, and therefore not relevant for humans. Absolute liver weights and liver/body weight ratios were significantly elevated in male and female rats at doses of 500 and 1000 ppm. Hepatocyte hypertrophy was observed histologically in all animals at dose levels of 500 and 1000 ppm. All males and five females at 250 ppm and seven male rats at 100 ppm also demonstrated hepatocyte hypertrophy. Total serum protein was significantly elevated in both sexes at dose levels of 500 and 1000 ppm and may be due to the hepatocellular changes. Serum albumin was significantly increased in all animals at the top dose level. If the hepatocyte hypertrophy observed is considered to be an adaptive response to a xenobiotic, then the NOAEL for this study is 100 ppm (13).

GENOTOXICITY

Ames test. PCBTF was tested for mutagenic activity at concentrations of 0.1 ul to 10 ul per plate in several strains of S. typhimurium, S. cerevisiae, and E. coli. There was no mutagenic response either with or without S9 metabolic activation (19).

In a study which was designed to detect mutagenic substances in the urine from PCBTF-treated mice, groups of mice were administered PCBTF i.p. in 50, 167, or 500 mg/kg doses for two days. Urine was collected at the end of the second day and added in 0.1, 0.2, or 0.3 ml amounts to plates containing S. typhimurium to determine if mutagenic substances were present. There was no increase in the mutant frequency of plates with the urine from PCBTF-treated animals when compared to the control, indicating that PCBTF is not metabolized to urine-excretable mutagenic substances in the mouse (20).

Sister-chromatid-exchanges in mouse lymphoma cells. PCBTF was tested for its ability to induce sister-chromatid-exchanges (SCEs) in mouse lymphoma cells. PCBTF induced SCEs in a statistically significant manner both with and without S9 metabolic activation at doses ranging from 0.0025 ul/ml to 0.04 ul/ml (equivalent to 2.5-40 ug/ml). Additionally, in the assay which did not incorporate metabolic activation, a dose-response effect was observed (21). A clearly defined dose response was not obtained with metabolic activation.

Mouse lymphoma cell forward mutation assay. In a mouse lymphoma cell forward mutation assay, PCBTF was used in doses ranging from 0.78 nl/ml to 400 nl/ml (equivalent to 0.78-400 ug/ml). PCBTF did not induce an increase in mutations in the mouse lymphoma cells (with or without metabolic activation) when compared to the controls (22). Doses higher than 50 nl/ml (50 ug/ml) with and without activation killed all the cells within 24 hours of treatment.

In vitro mouse BALB/3T3 transformation assay. PCBTF was tested for its ability to transform mouse BALB/3T3 cells. At concentrations ranging from 0.1 nl/ml to 40 nl/ml (.1 -40 ug/ml), PCBTF did not induce any transformed foci and therefore is considered inactive (23). The concentration range corresponded to a survival range of approximately 50 to 80% in a preliminary cytotoxicity test.

Chromosome aberration study. PCBTF was administered in doses ranging from 0.2 nl/ml to 200 nl/ml (0.2 to 200 ug/ml) in an *in vitro* assay which detects chromosome aberrations in Chinese hamster ovary cells. PCBTF did not induce significant increases in chromosome aberrations in cells (either with or without metabolic activation) when compared to the controls (24).

In vivo cytogenetics assay. In an in vivo cytogenetics assay, groups of 5 male and 5 female Sprague-Dawley rats were administered a single oral dose of 0 (corn oil), 0.5, 1.7, or 5 ml/kg PCBTF diluted in corn oil. Bone marrow cells were collected from the rats at 6, 24, and 48 hours after dosing and examined for chromosome aberrations. PCBTF did not induce any chromosome aberrations (25).

A 48-hour LC_{50} on daphnids was conducted using concentrations of 1.8, 3.2, 5.6, 10.0 and 18.0 mg/l PCBTF, with water and acetone/solvent controls. The LC_{50} was determined to be 12.4 mg/l with a NOAEL of 5.6 mg/l (33).

REFERENCES

1. Hooker Chemical Company (1980). Summary of Physico-chemical, Toxicological and Environmental Information: PCBTF.

2. Raltech Scientific Services, Inc. (1979). Acute Oral/Acute Dermal Toxicity in Albino Rats: PCBTF. Hooker Chemical Company.

3. Bio/dynamics Inc. (1979). An Acute Inhalation Toxicity Study of Parachlorobenzotrifluoride in the Rat. Hooker Chemical Company.

4. Khalepo, A. I., Lapina, L. M., Popova, S. M., Vorontsov, R. S. (1984). Data for Substantiating the Maximum Allowable Concentration of a,a,a-Trifluoro-4-chlorotoluene in the Air of Work Areas. Gig. truda 5: 49-51.

5. Raltech Scientific Services, Inc. (1978). Acute Dermal LD_{50}, Eye Irritation, Skin Irritation: PCBTF. Hooker Chemical Company.

6. Industrial Biotest Laboratories, Inc. (1975). Skin Chloracne Test in Final Product which will be PCBTF in Albino Rats. Hooker Chemical Company.

7. Elars Bioresearch Laboratories (1980). 14-Day Oral Range Finding Study of PCBTF in Rats. Hooker Chemical Company.

8. National Toxicology Program: Toxicity Studies of p-Chloro-a,a,a-Trifluorotoluene in F344/N Rats and B6C3F1 Mice - Comparative Fourteen-Day Gavage Studies in Corn Oil and a-Cyclodextrin. (March, 1991) U. S. Department of Health and Human Services/NIH

9. Raltech Scientific Services, Inc. (1979). PCBTF/3,4-DCBTF: 28-Day Feeding Study in Rats. Hooker Chemical Company.

10. Macrl, A., Ricciardi, C., Stazi, A. V., Mantovani, A., Macrl, C. V. (1987). Subchronic Oral Toxicity of 4-chloro-a,a,a-Trifluorotoluene in Sprague-Dawley Rats. Fd Chem. Toxicol: 25: 781-786.

11. Elars Bioresearch Laboratories (1981). Modified 90 Day Gavage and Reproduction Study in Rats: PCBTF. Hooker Chemical Company.

12. Lilly Research Laboratories (1983). A Subchronic (Three-Month) Toxicity Study in Fisher 344 Rats Given Daily Doses of 4-chlorobenzotrifluoride (PCBF).

27. Benigni, R., Bignami, M., Cont, L., Crebelli, R., Dogiotti, E., Falcone, E., and Carere, A. (1982). In vitro mutational studies with trifluralin and trifluorotoluene derivatives. Anan. Ist. Super. Sanita 18, N. 1 123-126.

28. Union Carbide Environmental Services (1979). The acute toxicity of parachlorobenzotrifluoride to rainbow trout, Salmo gairdneri Richardson. Hooker Chemicals & Plastics Corporation.

29. Union Carbide Environmental Services (1979). The acute toxicity of parachlorobenzotrifluoride to the bluegill sunfish, Lepomis macrochirus Rafinesque. Hooker Chemicals & Plastics Corporation.

30. Lilly Research Laboratories (1983). Bioconcentration of ^{14}C p-chlorobenzotrifluoride (P-CBT) by bluegill in a static test system.

31. EG&G, Bionomics Aquatic Toxicology Laboratories (1981). The toxicity of parachlorobenzotrifluoride (PCBTF) to fathead minnow, (Pimephales promelas) embryos and larvae. Hooker Specialty Chemical Division.

32. Union Carbide Environmental Services (1979). The acute toxicity of parachlorobenzotrifluoride to the water flea, Daphnia magna Straus. Hooker Chemicals & Plastics Corporation.

33. Union Carbide Environmental Services (1979). Daphnia magna chronic study testing Parachlorobenzotrifluoride (97% Active Ingredient). Hooker Chemicals & Plastics Corporation.

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYLENE CHLORIDE

MSDS Number: M4420 --- ***Effective Date: 03/01/97***

1. Product Identification

Synonyms: MC; Dichloromethane (DCM); Methylene dichloride; Methylene bichloride; Methane dichloride
CAS No.: 75-09-2
Molecular Weight: 84.93
Chemical Formula: CH2Cl2
Product Codes: 9264, 9266, 9315, 9324, 9329, 9330, 9341, 9348, Q480

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.

Ingestion:
May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light headedness to unconsciousness.

Skin Contact:
Causes irritation, redness and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.

Eye Contact:
Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.

Chronic Exposure:
Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances. Can cause dermatitis upon prolonged skin contact. Methylene chloride may cause cancer in humans.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or cardiovascular function may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never

give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 556C (1033F) Flammable limits in air % by volume: lel: 12; uel: 23 Forms flammable vapor-air mixtures above 100C (212F).

Explosion:
Concentrated can be ignited by a high intensity ignition source. Vapor may form flammable mixture in atmosphere that contains a high percentage of oxygen. Sealed containers may rupture when heated.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Outside or detached storage

is recommended. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. To minimize decomposition, all storage containers should be galvanized or lined with a phenolic coating. This material may corrode plastic and rubber. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Odor Threshold: 205 - 307 ppm. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Methylene Chloride (Dichloromethane): - OSHA Permissible Exposure Limit (PEL) - 25 ppm (TWA), 125 ppm (STEL), 12.5 ppm (8-hour TWA - Action Level) - ACGIH Threshold Limit Value (TLV) - 50 ppm (TWA), A2 - suspected human carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment. Natural rubber and polyvinyl chloride ARE NOT recommended materials for personal protective equipment.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. See OSHA Standard for medical surveillance, record keeping, and reporting requirements for methylene chloride (29 CFR 1910.1052).

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Chloroform-like odor.

Solubility:
1.32 gm/100 gm water @ 20C.

Specific Gravity:
1.33 @ 15C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
39.8C (104F)

Melting Point:
-97C (-143F)

Vapor Density (Air=1):
2.9

Vapor Pressure (mm Hg):
350 @ 20C (68F)

Evaporation Rate (BuAc=1):
27.5

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Emits highly toxic fumes of phosgene when heated to decomposition. Decomposes in a flame or hot surface to form toxic gas phosgene and corrosive mists of hydrochloric acid. Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. Avoid contact with open flames and electrical arcs. Liquid methylene chloride will attack some forms of plastics, rubber, and coatings.

Conditions to Avoid:

Moisture, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Dichloromethane: Oral rat LD50: 1600 mg/kg; inhalation rat LC50: 52 gm/m3; investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity:
Dichloromethane has been linked to spontaneous abortions in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methylene Chloride (75-09-2)	No	Yes	2B

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: DICHLOROMETHANE

Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 56L

International (Water, I.M.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 56L

International (Air, I.C.A.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 56L

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methylene Chloride (75-09-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methylene Chloride (75-09-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methylene Chloride (75-09-2)	1000	U080	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Prop 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S5

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 2 **Flammability:** 1 **Reactivity:** 0

Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

Label Precautions:
Do not breathe vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat and flame. Do not get in eyes, on skin, or on clothing.

Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: METHYLENE CHLORIDE

CAS Number: 75-09-2
DOT Number: UN 1593

RTK Substance number: 1255
Date: February 1989 Revision: November 1995

HAZARD SUMMARY

* **Methylene Chloride** can affect you when breathed in and by passing through your skin.
* **Methylene Chloride** should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
* Liquid or vapor can irritate and burn the eyes and skin.
* Breathing **Methylene Chloride** can irritate the nose and throat.
* Breathing **Methylene Chloride** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* High exposure can cause headache, nausea, fatigue, dizziness, drowsiness and unconsciousness.
* **Methylene Chloride** may damage the liver and brain, and cause bronchitis to develop.

IDENTIFICATION

Methylene Chloride is a colorless volatile liquid with a pleasant odor. It is used in food, furniture and plastics processing, and paint removers.

REASON FOR CITATION

* **Methylene Chloride** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NTP, NIOSH, DOT, DEP, NFPA, IARC, HHAG and EPA.
* This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN, MUTAGEN** and **TERATOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 160 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal permissible exposure limit (PEL) is **500 ppm** averaged over an 8-hour workshift, with an acceptable ceiling level of **1,000 ppm** and a maximum peak concentration of **2,000 ppm** for 5 minutes in any 2-hour period.

NIOSH: Recommends that occupational exposure to carcinogens be limited to the lowest feasible concentration.

ACGIH: The recommended airborne exposure limit is **50 ppm** averaged over an 8-hour workshift.

* **Methylene Chloride** is a POSSIBLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Methylene Chloride** and at the end of the workshift.
* Post hazard and warning information in the work area. Communicate all information on the health and safety hazards of **Methylene Chloride** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methylene Chloride**:

* Liquid or vapor can irritate and burn the eyes and skin.
* Breathing **Methylene Chloride** can irritate the nose and throat.
* Breathing **Methylene Chloride** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* High exposure can cause headache, nausea, fatigue, dizziness, drowsiness and unconsciousness.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methylene Chloride** and can last for months or years:

Cancer Hazard

* **Methylene Chloride** may be a CARCINOGEN in humans since it has been shown to cause liver and lung cancer in animals.
* Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* There is limited evidence that **Methylene Chloride** causes spontaneous abortions in female workers.

Other Long-Term Effects

* Repeated exposures may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
* Long-term exposure may damage the brain, causing memory loss, poor coordination, and reduced thinking ability.
* **Methylene Chloride** may damage the liver.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Lung function tests.

If symptoms develop or overexposure is suspected, the following may be useful:

* Consider chest x-ray after acute overexposure.
* Liver function tests.
* Interview for brain effects, including recent memory, mood (irritability, withdrawal), concentration, headaches, malaise and altered sleep patterns. Consider cerebellar, autonomic and peripheral nervous system evaluation. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

Conditions Made Worse By Exposure

Persons with heart pain (angina), significant coronary artery disease or significant anemia may be at increased risk.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Methylene Chloride** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Occupational Exposure to Methylene Chloride #76-138.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methylene Chloride** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methylene Chloride**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Methylene Chloride**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Methylene Chloride**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Methylene Chloride** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methylene Chloride**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Polyvinyl Alcohol* as fair to good protective materials.

Eye Protection

* Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **50 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **5,000 ppm** is immediately dangerous to life and health. If the possibility of exposures above **5,000 ppm** exists, use a MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects, without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?

A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?

A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?

A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: METHYLENE CHLORIDE
DOT Number: UN 1593
NAERG Code: 160
CAS Number: 75-09-2

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	1
REACTIVITY	-	0
CARCINOGEN FORMS FLAMMABLE MIXTURE WITH AIR POISONOUS GASES ARE PRODUCED IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Methylene Chloride** is not combustible but MAY FORM A FLAMMABLE MIXTURE WITH AIR.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Chloride* and *Phosgene*.
* Extinguish fire using an agent suitable for type of surrounding fire. **Methylene Chloride** itself does not burn.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methylene Chloride** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* It may be necessary to contain and dispose of **Methylene Chloride** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

==========

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

==========

HANDLING AND STORAGE

* Prior to working with **Methylene Chloride** you should be trained on its proper handling and storage.
* **Methylene Chloride** is not compatible with ALKALI METALS, ALUMINUM or HEAT.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT and MOISTURE.

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention immediately.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation for 24-48 hours is advised for higher exposures since a delay in fluid build-up in the lungs can occur.

PHYSICAL DATA

Vapor Pressure: 350 mm Hg at 68°F (20°C)
Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:
Methane, Dichloro-
Other Names:
Methylene Dichloride; Aerothene MM

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Methylene Chloride

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methylene Chloride

SYNONYM(s): Methylene dichloride; Dichloromethane; Composite Constituent

IMIS: 1730

CAS: 75-09-2

NIOSH: RTECS PA8050000; 47881

DOT: UN1593 Flammable Liquid

DESCRIPTION:

Colorless liquid with a chloroform-like odor.
MW: 85
BP: 104 F
VP: 350 mm
MP: -142 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 25 ppm TWA; 125 ppm STEL 29 CFR 1910.1052

OSHA CONSTRUCTION INDUSTRY STANDARDS: 500 ppm, 1740 mg/m3 TWA

THRESHOLD LIMIT VALUE: 50 ppm, 174 mg/m3 TWA; Appendix A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans)

RECOMMENDED EXPOSURE LIMIT: Potential Carcinogen; Lowest Feasible Concentration

Health Factors

IARC: Group 2B, possibly carcinogenic to humans (Dichloromethane)

SYMPTOM(s): Fatigue, weakness, sleepiness, lightheadedness; numb limbs, tingling; nausea; eye, skin irritation; (carcinogenic)

HEALTH EFFECTS: Chemical anoxia (Metabolic conversion to CO) (HE17) Cumulative liver damage (HE3) CNS effects/Narcosis (HE8); Mutagen (HE2)

ORGAN: Skin, CVS, eyes, CNS

Monitoring

SLC1:

MEDIA: Charcoal Tube (350/350/350 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters **MAX F:** 0.05 L/min (TWA)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Ceiling or STEL)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 59)
SAE: 0.11
CLASS: Fully Validated

MEDIA: Carbosieve S-III Tube (130/65 mg sections, 60/80 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters **MAX F:** 0.05 L/min (TWA)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Ceiling or STEL)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 80)
SAE: 0.11
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Draeger
PART #: 67 24601 **RANGE:** 50-2000 ppm
CLASS: SLTC **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 180S **RANGE:** 10-1000 ppm
CLASS: SLTC **DEVICE:** Inspect Air MC Monitor **COMPANY:** TSI
PART #: Model 8710 **RANGE:** 0.5-100 ppm
CLASS: SLTC **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 85834 **RANGE:** 100-2000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 462516 **RANGE:** 0-3000 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.4 ppm @ 13.5 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-300 ppm @ 7.9 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector (11.7 eV Lamp)
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 01/12/1999

NIOSH Pocket Guide to Chemical Hazards

Methylene chloride	CAS 75-09-2
CH_2Cl_2	RTECS PA8050000
Synonyms & Trade Names Dichloromethane, Methylene dichloride	**DOT ID & Guide** 1593 160

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1052] TWA 25 ppm ST 125 ppm
IDLH Ca [2300 ppm] See: 75092	**Conversion** 1 ppm = 3.47 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor. [Note: A gas above 104°F.]

MW: 84.9	BP: 104°F	FRZ: -139°F	Sol: 2%
VP: 350 mmHg	IP: 11.32 eV		Sp.Gr: 1.33
Fl.P: ?	UEL: 23%	LEL: 13%	

Combustible Liquid

Incompatibilities & Reactivities
Strong oxidizers; caustics; chemically-active metals such as aluminum, magnesium powders, potassium & sodium; concentrated nitric acid

Measurement Method
Charcoal tube(2); CS_2; Gas chromatography/Flame ionization detection; IV [#1005] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R. Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; fatigue, weakness, somnolence (sleepiness, unnatural drowsiness), lightheadedness; numbness, tingle limbs; nausea; [Potential occupational carcinogen]

Target Organs Eyes, skin, cardiovascular system, central nervous system

Cancer Site [in animals: lung, liver, salivary & mammary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0058 See MEDICAL TESTS: 0148

Chemical Sampling Information
Methylene Chloride

Chemical Sampling Information - Table of Contents

Field Definitions
Analytical Methods
Health Guidelines

General Description

NAME: Methylene Chloride

SYNONYM(s): Methylene dichloride; Dichloromethane; Composite Constituent

IMIS: 1730

CAS: 75-09-2

NIOSH: RTECS PA8050000; 47881

DOT: UN1593 Flammable Liquid

DESCRIPTION:

Colorless liquid with a chloroform-like odor.
MW: 85
BP: 104 F
VP: 350 mm
MP: -142 F

INCOM: Strong oxidizers and caustics; chemically active metals, such as aluminum or magnesium powders, sodium, potassium

Exposure Limits

OSHA GENERAL INDUSTRY PEL: 25 ppm TWA; 125 ppm STEL 29 CFR 1910.1052

OSHA CONSTRUCTION INDUSTRY PEL: 25 ppm TWA; 125 ppm STEL 29 CFR 1926.1152

ACGIH TLV: 50 ppm, 174 mg/m3 TWA; Appendix A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans)

NIOSH REL: Potential Carcinogen; Lowest Feasible Concentration

Health Factors

NTP: Suspect Human Carcinogen

IARC: Group 2B, possibly carcinogenic to humans (Dichloromethane)

SYMPTOM(s): Fatigue, weakness, sleepiness, lightheadedness; numb limbs, tingling; nausea; eye, skin irritation; (carcinogenic)

HEALTH EFFECTS: Chemical anoxia (Metabolic conversion to CO) (HE17) Cumulative liver damage (HE3) CNS effects/Narcosis (HE8); Mutagen (HE2)

ORGAN: Skin, CVS, eyes, CNS

Monitoring

PRIMARY SAMPLING/ANALYTICAL METHOD (SLC1):

MEDIA: Charcoal Tube (350/350/350 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters **MAX F:** 0.05 L/min (TWA)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Ceiling or STEL)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID

REF: 2 (OSHA 59)
SAE: 0.11
CLASS: Fully Validated

MEDIA: Carbosieve S-III Tube (130/65 mg sections, 60/80 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters **MAX F:** 0.05 L/min (TWA)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Ceiling or STEL)
MIN T: 5 minutes **MAX F:** 0.05 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 80)
SAE: 0.11
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Draeger
PART #: 67 24601 **RANGE:** 50-2000 ppm
CLASS: SLTC
DEVICE: Detector Tube **COMPANY:** Kitagawa
PART #: 180S **RANGE:** 10-1000 ppm
CLASS: SLTC
DEVICE: Inspect Air MC Monitor **COMPANY:** TSI
PART #: Model 8710 **RANGE:** 0.5-100 ppm
CLASS: SLTC
DEVICE: Detector Tube **COMPANY:** MSA
PART #: 85834 **RANGE:** 100-2000 ppm
CLASS: Mfg
DEVICE: Detector Tube **COMPANY:** MSA
PART #: 462516 **RANGE:** 0-3000 ppm
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Infrared Spectrophotometer
PART #: MIRAN 1A & 1B **RANGE:** 0.4 ppm @ 13.5 um
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Infrared Spectrophotometer
PART #: MIRAN 103 **RANGE:** 0-300 ppm @ 7.9 um
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Organic Vapor Analyzer
PART #: Organic Vapor Analyzer
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** PID
PART #: Photoionization Detector (11.7 eV Lamp)

CLASS: Mfg

Chemical Sampling Information - Table of Contents

Revision Date: 01/27/2000

* **All Trademarks are the property of their respective owners.**

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYLENE CHLORIDE

MSDS Number: M4420 --- *Effective Date: 06/30/98*

1. Product Identification

Synonyms: MC; Dichloromethane (DCM); Methylene dichloride; Methylene bichloride; Methane dichloride
CAS No.: 75-09-2
Molecular Weight: 84.93
Chemical Formula: CH2Cl2
Product Codes: 9264, 9266, 9295, 9315, 9324, 9329, 9330, 9341, 9348, 9350, 9965, Q480

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methylene Chloride	75-09-2	> 99%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse.
Ingestion:
May cause irritation of the gastrointestinal tract with vomiting. If vomiting results in aspiration, chemical pneumonia could follow. Absorption through gastrointestinal tract may produce symptoms of central nervous system depression ranging from light headedness to unconsciousness.
Skin Contact:
Causes irritation, redness and pain. Prolonged contact can cause burns. Liquid degreases the skin. May be absorbed through skin.
Eye Contact:
Vapors can cause eye irritation. Contact can produce pain, inflammation and temporal eye damage.
Chronic Exposure:
Can cause headache, mental confusion, depression, liver effects, kidney effects, bronchitis, loss of appetite, nausea, lack of balance, and visual disturbances. Can cause dermatitis upon prolonged skin contact. Methylene chloride may cause cancer in humans.
Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders, eye problems, impaired liver, kidney, respiratory or cardiovascular function may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 556C (1033F)
Flammable limits in air % by volume:
lel: 12; uel: 23

Forms flammable vapor-air mixtures above 100C (212F).
Explosion:
Concentrated can be ignited by a high intensity ignition source. Vapor may form flammable mixture in atmosphere that contains a high percentage of oxygen. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Outside or detached storage is recommended. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. To minimize decomposition, all storage containers should be galvanized or lined with a phenolic coating. This material may corrode plastic and rubber. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Odor Threshold: 205 - 307 ppm. The odor threshold only serves as a warning of exposure; not smelling it does not mean you are not being exposed.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Methylene Chloride (Dichloromethane):
- OSHA Permissible Exposure Limit (PEL) -
25 ppm (TWA), 125 ppm (STEL), 12.5 ppm (8-hour TWA - Action Level)
- ACGIH Threshold Limit Value (TLV) -
50 ppm (TWA), A2 - suspected human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. The cartridges recommended for this material have a predicted service of less than 30 minutes at

concentrations of ten times (10x) the exposure limits. Actual service life will vary considerbly, depending on concentration levels, temperature, humidity, and work rate. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment. Natural rubber and polyvinyl chloride ARE NOT recommended materials for personal protective equipment.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
Do not use closed circuit rebreathing system employing soda lime or other carbon dioxide absorber because of formation of toxic compounds capable of producing cranial nerve paralysis. See OSHA Standard for medical surveillance, record keeping, and reporting requirements for methylene chloride (29 CFR 1910.1052).

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Chloroform-like odor.

Solubility:
1.32 gm/100 gm water @ 20C.

Specific Gravity:
1.33 @ 15C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
39.8C (104F)

Melting Point:
-97C (-143F)

Vapor Density (Air=1):
2.9

Vapor Pressure (mm Hg):
350 @ 20C (68F)

Evaporation Rate (BuAc=1):
27.5

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Emits highly toxic fumes of phosgene when heated to decomposition. Decomposes in a flame or hot surface to form toxic gas phosgene and corrosive mists of hydrochloric acid. Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. Avoid contact with open flames and electrical arcs. Liquid methylene chloride will attack some forms of plastics, rubber, and coatings.
Conditions to Avoid:
Moisture, heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Dichloromethane: Oral rat LD50: 1600 mg/kg; inhalation rat LC50: 52 gm/m3; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Dichloromethane has been linked to spontaneous abortions in humans.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methylene Chloride (75-09-2)	No	Yes	2B

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material

is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of greater than 30 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Water, I.M.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III
Information reported for product/size: 52L

International (Air, I.C.A.O.)

Proper Shipping Name: DICHLOROMETHANE
Hazard Class: 6.1
UN/NA: UN1593
Packing Group: III

Information reported for product/size: 52L

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Methylene Chloride (75-09-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methylene Chloride (75-09-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methylene Chloride (75-09-2)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methylene Chloride (75-09-2)	1000	U080	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2Z
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, CARDIOVASCULAR SYSTEM, AND BLOOD. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Do not get in eyes, on skin, or on clothing.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 1, 2.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

Tolylene-2,4-diisocyanate

MSDS Number: T4224 --- *Effective Date: 09/08/97*

1. Product Identification

Synonyms: Toluene-2,4-diisocyanate
CAS No.: 584-84-9
Molecular Weight: 174.16
Chemical Formula: CH3C6H3(NCO)2
Product Codes: W075

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene-2,4-diisocyanate	584-84-9	98 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE SEVERE ALLERGIC RESPIRATORY OR SKIN REACTION. CAUSES BURNS TO ANY AREA OF CONTACT. VAPOR IS SEVERELY IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG DAMAGE. WATER REACTIVE. HAZARDOUS POLYMERIZATION MAY OCCUR. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

Potential Health Effects

Inhalation:
Inhalation can cause severe irritation of upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, acute asthmatic attacks, shortness of breath, headache, nausea and vomiting. If breathing zone concentration reaches 0.5 ppm, the possibility of respiratory response is imminent with latent periods of 4 - 8 hours. Neurologic effects of exposure include euphoria, loss of coordination and unconsciousness. Male impotence is reported and is probably caused by neurologic rather than direct effect on the male genitalia. May cause sensitization.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach. Can cause sore throat, vomiting, diarrhea.

Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Vapors may cause irritation and sensitization.
Eye Contact:
Corrosive! Vapors are severely irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Allergic, asthmatic respiratory sensitivity to future TDI exposure is likely unless present exposure is strictly limited or controlled. Individuals hypersensitive to this material can suffer long-term effects or skin sensitization, even with 0.02-ppm and lower exposures, and may take 6 months to 20 years to develop. Once sensitized, reactions can occur to 0.005-ppm concentrations or less. May cause cancer based upon studies with laboratory animals.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, blood disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
If severe inhalation exposure is suspected, immediate hospitalization with careful monitoring for the delayed (up to 72 hours) onset of pulmonary edema is suggested. Steroids may be useful in decreasing or controlling the inflammatory response of the lungs if administered on a short-term basis (2 to 4 days). Activated charcoal slurry is recommended for ingestion. Although there is dermal absorption, significant systemic

toxicity is unlikely if the exposure is only via skin exposure.

5. Fire Fighting Measures

Fire:
Flash point: 127C (261F) CC
Autoignition temperature: 620C (1148F)
Flammable limits in air % by volume:
lel: 0.9; uel: 9.5

Moderate fire hazard when exposed to heat or flame.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Carbon dioxide or dry chemical. Do not use water or foam. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Keep away from water. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
0.02 ppm (Ceiling)

-ACGIH Threshold Limit Value (TLV):
0.005 ppm (TWA), 0.02 ppm (STEL)
A4, Not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.
Other Control Measures:
There is insufficient data in the published literature to assign complete numerical SAF-T-DATA* ratings and laboratory protective equipment for this product. Special precautions must be used in storage, use and handling. Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction or test to be conducted and the available ventilation, with overriding consideration to minimize contact with the chemical.

---

9. Physical and Chemical Properties

Appearance:
Colorless to yellow liquid.
Odor:
Sharp, penetrating odor.
Solubility:
Decomposes
Specific Gravity:
1.22 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
250C (482F)
Melting Point:
12C (54F)
Vapor Density (Air=1):
6
Vapor Pressure (mm Hg):

10 @ 120C (248F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May form cyanide fumes and oxides of carbon and nitrogen if heated to decomposition.
Hazardous Polymerization:
May occur if heated, mixed with water, or contacted with concentrated with concentrated alkaline compounds such as sodium hydroxide, acyl chlorides, or tert-amine compounds.

Incompatibilities:
Compounds containing active hydrogen (water, ammonia, amines, alcohols, and caustics such as sodium hydroxide, etc...).
Conditions to Avoid:
Moisture, heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 14 ppm/4-hour; Skin rabbit LD50: > 16 mL/kg. Investigated as a tumorigen and mutagen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Toluene-2,4-diisocyanate (584-84-9)	No	Yes	2B

12. Ecological Information

Environmental Fate:
If spilled on wet land, TDI is rapidly degraded. If released into water, a crust forms around the liquid TDI and < 0.5 % of the original material remains 35 days. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition. When released into the air, this material is expected to have a half-life of less than 1 day.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of

this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE DIISOCYANATE
Hazard Class: 6.1
UN/NA: UN2078
Packing Group: II
Information reported for product/size: 1KG

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE DIISOCYANATE
Hazard Class: 6.1
UN/NA: UN2078
Packing Group: II
Information reported for product/size: 1KG

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Toluene-2,4-diisocyanate (584-84-9)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Toluene-2,4-diisocyanate (584-84-9)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	List	------SARA 313------ Chemical Catg.
Toluene-2,4-diisocyanate (584-84-9)	100	500	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Toluene-2,4-diisocyanate (584-84-9)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Pure / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2XE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **1** Reactivity: **3** Other: **Water reactive**
Label Hazard Warning:
DANGER! HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE SEVERE ALLERGIC RESPIRATORY OR SKIN REACTION. CAUSES BURNS TO ANY AREA OF CONTACT. VAPOR IS SEVERELY IRRITATING TO EYES AND RESPIRATORY TRACT. INHALATION MAY CAUSE LUNG DAMAGE. WATER REACTIVE. HAZARDOUS POLYMERIZATION MAY OCCUR. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
No SAF-T-DATA Ratings have been developed for this product. Read and follow all warnings, precautions, instructions and other safety and handling information on the label and MSDS.
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat.
Do not contact with water.
Label First Aid:
In case of contact, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:

Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR

DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **TOLUENE-2,4-DIISOCYANATE**
CAS Number: 584-84-9
DOT Number: UN 2078

RTK Substance number: 1869
Date: September 1986 Revision: February 1996

HAZARD SUMMARY

* **Toluene-2,4-Diisocyanate** can affect you when breathed in.
* **Toluene-2,4-Diisocyanate** is a CARCINOGEN--HANDLE WITH EXTREME CAUTION.
* Contact can irritate and burn the eyes and skin.
* The vapor can irritate the nose and throat causing coughing and chest tightness.
* Breathing **Toluene-2,4-Diisocyanate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* **Toluene-2,4-Diisocyanate** may cause an asthma-like allergy. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
* Repeated high exposure may cause memory and concentration problems.

IDENTIFICATION

Toluene-2,4-Diisocyanate is a colorless to pale yellow liquid with a strong fruity odor. It is used to make polyurethane foams, elastomers and coatings.

REASON FOR CITATION

* **Toluene-2,4-Diisocyanate** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, NTP, DEP, IARC, NFPA, EPA and other authorities.
* This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.17 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.02 ppm** not to be exceeded at any time.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The recommended airborne exposure limit is **0.005 ppm** averaged over an 8-hour workshift and **0.02 ppm** as a STEL (short term exposure limit).

* **Toluene-2,4-Diisocyanate** is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.

WAYS OF REDUCING EXPOSURE

* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* A regulated, marked area should be established where **Tolluene-2,4-Diisocyanate** is handled, used, or stored.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Toluene-2,4-Diisocyanate** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Toluene-2,4-Diisocyanate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Toluene-2,4-Diisocyanate**:

* Contact can irritate and burn the eyes and skin. Prolonged contact can cause eye damage.
* The vapor can irritate the nose and throat causing coughing and chest tightness.
* Breathing **Toluene-2,4-Diisocyanate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Toluene-2,4-Diisocyanate** and can last for months or years:

Cancer Hazard

* **Toluene-2,4-Diisocyanate** is a PROBABLE CARCINOGEN in humans. It has been shown to cause pancreas, liver and breast cancer in animals.
* Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard

* There is limited evidence that exposure to **Toluene-2,4-Diisocyanate** may cause temporary impotence in males.

Other Long-Term Effects

* **Toluene-2,4-Diisocyanate** may cause an asthma-like allergy. Future exposures can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.
* Repeated high exposure may cause memory and concentration problems.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Lung function tests.

If symptoms develop or overexposure is suspected, the following may be useful:

* Consider chest x-ray after acute overexposure.
* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose allergy.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

Conditions Made Worse By Exposure

Persons already allergic to **Toluene-2,4-Diisocyanate** or other *Isocyanate* chemicals can have symptoms with extremely low levels of exposure, sometimes too low to be detected by usual means of measurement.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Toluene-2,4-Diisocyanate** from drums or other storage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *Occupational Exposure to Toluene Diisocyanate #73-11022.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Toluene-2,4-Diisocyanate** should change into clean clothing promptly.
* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Toluene-2,4-Diisocyanate**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* On skin contact with **Toluene-2,4-Diisocyanate**, immediately wash or shower to remove the chemical.
* On skin contact with **Toluene-2,4-Diisocyanate**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Toluene-2,4-Diisocyanate**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Toluene-2,4-Diisocyanate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Toluene-2,4-Diisocyanate**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day and put on before work.
* ACGIH recommends *Butyl Rubber* and AIHA recommends *Butyl Nitrile* or *Natural Rubber* as protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **0.005 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **2.5 ppm** is immediately dangerous to life and health. If the possibility of exposure above **2.5 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Toluene-2,4-Diisocyanate** you should be trained on its proper handling and storage.
* A regulated, marked area should be established where **Toluene-2,4-Diisocyanatae** is handled, used, or stored.
* Store in tightly closed containers in a cool, well-ventilated area away from AMINES, STRONG BASES (such as SODIUM HYDROXIDE), and ALCOHOLS.
* **Toluene-2,4-Diisocyanate** reacts with WATER releasing *Carbon Dioxide* gas.
* **Toluene-2,4-Diisocyanate** will polymerize and rupture containers at temperatures over 350°F (176.5^{o}C).
* At normal temperatures (70°F) **Toluene-2,4-Diisocyanate** levels quickly exceed the PEL and therefore proper ventilation <u>must</u> be in use or personal protective equipment <u>must</u> be worn.
* Sources of ignition, such as smoking and open flames, are prohibited where **Toluene-2,4-Diisocyanate** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: Should I be concerned if a chemical causes cancer in animals?
A: Yes. Most scientists agree that a chemical that causes cancer in animals should be treated as a suspected human carcinogen unless proven otherwise.

Q: But don't they test animals using much higher levels of a chemical than people usually are exposed to?
A: Yes. That's so effects can be seen more clearly using fewer animals. But high doses alone don't cause cancer unless it's a cancer agent. In fact, a chemical that causes cancer in animals at high doses could cause cancer in humans exposed to low doses.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?
A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **TOLUENE-2,4-DIISOCYANATE**
DOT Number: **UN 2078**
NAERG Code: **156**
CAS Number: **584-84-9**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	1
REACTIVITY	-	1
CARCINOGEN POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Use dry chemical or CO_2 extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Cyanide* and *Oxides of Nitrogen*.
* CONTAINERS MAY EXPLODE IN FIRE.
* Water spray may be used to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Toluene-2,4-Diisocyanate** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is completed by ***specially trained individuals***.
* Remove all ignition sources.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Ventilate area of spill or leak after clean-up is complete.
* Keep **Toluene-2,4-Diisocyanate** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Toluene-2,4-Diisocyanate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0.04 mm Hg at 68°F (20°C)
Flash Point: 270°F (118°C)
Water Solubility: Insoluble/Reactive

OTHER COMMONLY USED NAMES

Chemical Name:

Benzene, 2,4-Diisocyanato-1-Methyl-

Other Names:

TDI; 2,4-Diisocyanatotoluene; Isocyanic Acid, Methyl-phenylene Ester; 4-Methyl-Phenylene Diisocyanate; 2,4-Toluene Diisocyanate

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Toluene-2,4-Diisocyanate (TDI)

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Toluene-2,4-Diisocyanate (TDI)

SYNONYM(s): TDI; 2,4-Tolylene diisocyanate; 2,4-TDI; Toluene-2,4-Diisocyanate prior to 9/1/89

IMIS: 2470

CAS: 584-84-9

NIOSH: RTECS CZ6300000; 13829

DOT: UN2078 Poison

DESCRIPTION:

Colorless, yellow, or dark liquid or solid with a sweet, fruity, pungent odor.
MW: 174
BP: 484 F
VP: approx. 0.04 mm
MP: 71 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 0.02 ppm, 0.14 mg/m3 Ceiling

OSHA CONSTRUCTION INDUSTRY STANDARDS: 0.02 ppm, 0.14 mg/m3 Ceiling

THRESHOLD LIMIT VALUE: 0.005 ppm, 0.036 mg/m3 TWA; 0.02 ppm, 0.14 mg/m3 STEL; Appendix A4 (Not Classifiable as a Human Carcinogen)

Health Factors

IARC: Group 2B, possibly carcinogenic to humans (Toluene Diisocyanates)

SYMPTOM(s): Nose, throat irritation; choking, paroxysmal coughing; chest pain, retrosternal soreness; nausea, vomiting, abdominal pain; bronchial spasms, pulmonary edema, dyspnea, asthma; conjunctivitis, lacrimation; dermatitis, skin sensitization; (carcinogenic)

HEALTH EFFECTS: Asthma (HE9); Dermatitis (HE3) Irritation-Eye, Nose, Throat, Skin---Marked (HE14)

ORGAN: Respiratory system, skin

Monitoring

SLC1:

MEDIA: Coated Glass Fiber Filter (37 mm open face) Coated with 0.1 mg 1-(2-Pyridyl)piperazine
ANL SOLVENT: 90/10 (v/v) Acetonitrile/Dimethyl Sulfoxide
MAX V: 240 Liters **MAX F:** 1.0 L/min (TWA)
MAX V: 15 Liters **MAX F:** 1.0 L/min (STEL)
MAX V: 15 Liters **MAX F:** 1.0 L/min (Ceiling)
ANL 1: High Performance Liquid Chromatography; HPLC/UV/FLU
REF: 2 (OSHA 42)
SAE: 0.17
CLASS: Fully Validated
NOTE: OSHA personnel may obtain filters from SLTC and refrigerate until used.

COND: Column: C8 Mobile Phase: 37.5: 62.5 Acetonitrile: Water with . 0.01 M Ammonium Acetate Detector Wavelength: Ex 254, Em 313 Detection Limit:

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Draeger
PART #: 67 24501 **RANGE:** 0.02-0.2 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-1 ppm @ 4.4 um
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 01/19/1999

NIOSH Pocket Guide to Chemical Hazards

Toluene-2,4-diisocyanate	**CAS** 584-84-9
$CH_3C_6H_3(NCO)_2$	**RTECS** CZ6300000
Synonyms & Trade Names TDI; 2,4-TDI; 2,4-Toluene diisocyanate	**DOT ID & Guide** 2078 156

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: C 0.02 ppm (0.14 mg/m^3)

IDLH Ca [2.5 ppm] See: 584849	**Conversion** 1 ppm = 7.13 mg/m^3

Physical Description
Colorless to pale-yellow solid or liquid (above 71°F) with a sharp, pungent odor.

MW: 174.2	BP: 484°F	MLT: 71°F	Sol: Insoluble
VP(77°F): 0.01 mmHg	IP: ?		Sp.Gr: 1.22
Fl.P: 260°F	UEL: 9.5%	LEL: 0.9%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, water, acids, bases & amines (may cause foam & spatter); alcohols [Note: Reacts slowly with water to form carbon dioxide and polyureas.]

Measurement Method
Impinger; Reagent; High-pressure liquid chromatography/Fluorescence/Electrochemical detection; IV [#5522, Isocyanates] [Also #2535, #5521] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated/Daily Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; choke, paroxysmal cough; chest pain, retrosternal (occurring behind the sternum) soreness; nausea, vomiting, abdominal pain; bronchitis, bronchospasm, pulmonary edema; dyspnea (breathing difficulty), asthma; conjunctivitis, lacrimation (discharge of tears); dermatitis, skin sensitization; [Potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: pancreas, liver, mammary gland, circulatory system & skin tumors]
See also: INTRODUCTION See ICSC CARD: 0339 See MEDICAL TESTS: 0233

International Chemical Safety Cards

HEXAMETHYLENE DIISOCYANATE

ICSC: 0278

HEXAMETHYLENE DIISOCYANATE
HMDI
1,6-Hexamethylene diisocyanate
1,6-Diisocyanatohexane
$C_8H_{12}N_2O_2$/OCN-$(CH_2)_6$-NCO
Molecular mass: 168.2

CAS # 822-06-0
RTECS # MO1740000
ICSC # 0278
UN # 2281
EC # 615-011-00-1

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Burning sensation. Cough. Laboured breathing. Shortness of breath. Sore throat.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
• SKIN	MAY BE ABSORBED! Redness. Skin burns. Blisters.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
• EYES	Redness. Pain. Swelling of eyelids.	Face shield or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Separated from incompatible materials (see Chemical Dangers), food and feedstuffs. Cool. Dry. Keep in the dark. Ventilation along the floor.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. T symbol R: 23-36/37/38-42/43 S: (1/2-)26-28-38-45 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0278

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

HEXAMETHYLENE DIISOCYANATE

ICSC: 0278

IMPORTANT DATA		
	PHYSICAL STATE; APPEARANCE: CLEAR, COLOURLESS LIQUID , WITH PUNGENT ODOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance will polymerize under the influence of temperatures above 93°C. On combustion, forms toxic and corrosive fumes including nitrogen oxides and hydrogen cyanide (see ICSC # 0492). The substance decomposes on contact with water to form amine and polyureas. Reacts violently with acids, alcohols, amines, bases and oxidants causing fire and explosion hazard. Attacks copper. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: 0.005 ppm; 0.035 mg/m^3 as TWA (ACGIH 1992-1993).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour, by inhalation of its aerosol and through the skin. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C; on spraying or dispersing, however, much faster. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance irritates the eyes, the skin and the respiratory tract. Exposure far above the TLV may result in respiratory sensitization. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma (see Notes).
PHYSICAL PROPERTIES	Boiling point: 255°C Melting point: -67°C Relative density (water = 1): 1.05 Solubility in water: Reacts Vapour pressure, Pa at 25°C: 7 Relative vapour density (air = 1): 5.8	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.00 Flash point: 140°C o.c. Auto-ignition temperature: 454°C Explosive limits, vol% in air: 0.9-9.5 Octanol/water partition coefficient as log Pow: 1.08
ENVIRONMENTAL DATA		

NOTES

Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance. Workers exposed to this compound may be sensitized to other isocyanates (asthma). The odour warning when the exposure limit value is exceeded is insufficient. Do NOT take working clothes home. Desmodur H and Desmodur N are trade names.

Transport Emergency Card: TEC (R)-61G06b

ADDITIONAL INFORMATION

© IPCS, CEC, 1993

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **HEXAMETHYLENE DIISOCYANATE**

CAS Number: 822-06-0
DOT Number: UN 2281

RTK Substance number: 0995
Date: May 1986 Revision: April 1999

HAZARD SUMMARY

* **Hexamethylene Diisocyanate** can affect you when breathed in and by passing through your skin.
* Contact can severely irritate and burn the eyes and skin with possible permanent damage.
* Breathing **Hexamethylene Diisocyanate** can irritate the nose and throat.
* Breathing **Hexamethylene Diisocyanate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Exposure to **Hexamethylene Diisocyanate** can cause headache, nausea, vomiting and irritability.
* **Hexamethylene Diisocyanate** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
* **Hexamethylene Diisocyanate** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.

IDENTIFICATION

Hexamethylene Diisocyanate is a colorless liquid with an irritating odor. It is used to make other chemicals and *polyurethanes*.

REASON FOR CITATION

* **Hexamethylene Diisocyanate** is on the Hazardous Substance List because it is cited by ACGIH, DOT, NIOSH and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

NIOSH: The recommended airborne exposure limit is **0.005 ppm** averaged over a 10-hour workshift and **0.02 ppm**, not to be exceeded during any 10 minute work period.

ACGIH: The recommended airborne exposure limit is **0.005 ppm** averaged over an 8-hour workshift.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Hexamethylene Diisocyanate** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Hexamethylene Diisocyanate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Hexamethylene Diisocyanate**:

* Contact can severely irritate and burn the eyes and skin with possible permanent damage.
* Breathing **Hexamethylene Diisocyanate** can irritate the nose and throat.
* Breathing **Hexamethylene Diisocyanate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Exposure to **Hexamethylene Diisocyanate** can cause headache, nausea, vomiting and irritability.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Hexamethylene Diisocyanate** and can last for months or years:

Cancer Hazard

* There is no evidence that **Hexamethylene Diisocyanate** causes cancer in animals. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

Reproductive Hazard

* There is no evidence that **Hexamethylene Diisocyanate** affects reproduction. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

Other Long-Term Effects

* **Hexamethylene Diisocyanate** may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
* **Hexamethylene Diisocyanate** may cause an asthma-like allergy. Future exposure can cause asthma attacks with shortness of breath, wheezing, cough, and/or chest tightness.

MEDICAL

Medical Testing

Before beginning employment and at regular times after that, the following are recommended:

* Lung function tests. These may be normal if the person is not having an attack at the time of the test.

If symptoms develop or overexposure is suspected, the following are recommended:

* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose skin allergy.
* Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically pump liquid **Hexamethylene Diisocyanate** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Hexamethylene Diisocyanate** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Hexamethylene Diisocyanate**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Hexamethylene Diisocyanate**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Hexamethylene Diisocyanate**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Hexamethylene Diisocyanate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Hexamethylene Diisocyanate**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear indirect-vent, impact and splash resistant goggles when working with liquids.
* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over **0.005 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Hexamethylene Diisocyanate** you should be trained on its proper handling and storage.
* **Hexamethylene Diisocyanate** will react with WATER or MOISTURE to produce *Carbon Dioxide*.
* **Hexamethylene Diisocyanate** is not compatible with AMINES; CARBOXYLIC ACIDS; ALCOHOLS; STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ORGANOTIN CATALYSTS; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC).
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT as **Hexamethylene Diisocyanate** will polymerize and container rupture may occur.
* Sources of ignition, such as smoking and open flames, are prohibited where **Hexamethylene Diisocyanate** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: http://www.state.nj.us/health/eoh/odisweb/

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **HEXAMETHYLENE DIISOCYANATE**
DOT Number: **UN 2281**
NAERG Code: **156**
CAS Number: **822-06-0**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	1	-
REACTIVITY	1	-
COMBUSTIBLE DO NOT USE WATER POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Hexamethylene Diisocyanate is a COMBUSTIBLE LIQUID.
* Use dry chemical or CO_2 extinguishers. DO NOT USE WATER.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Oxides of Nitrogen*, *Hydrogen Cyanide*, and *Carbon Monoxide*.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use water spray to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Hexamethylene Diisocyanate** is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Ventilate area of spill or leak after clean-up is complete.
* It may be necessary to contain and dispose of **Hexamethylene Diisocyanate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0.05 mm Hg at 77°F (25°C)
Flash Point: 284°F (140°C)
Water Solubility: Reactive

OTHER COMMONLY USED NAMES

Chemical Name:
Hexane, 1,6-Diisocyanato-
Other Names:
1,6-Diisocyanatohexane; 1,6-Hexanediol Diisocyanate

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Hexamethylene Diisocyanate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Hexamethylene Diisocyanate

SYNONYM(s): HDI; 1,6-Hexamethylene Diisocyanate; Desmodur N

IMIS: 1377

CAS: 822-06-0

NIOSH: RTECS MO1740000; 39495

DOT: UN2281 Poison

DESCRIPTION:

MW: 168.22
MOLFM: C8H12N2O2 Liquid.

Exposure Limits

THRESHOLD LIMIT VALUE: 0.005 ppm, 0.034 mg/m3 - TWA

RECOMMENDED EXPOSURE LIMIT: 0.035 mg/m3 TWA, 0.14 mg/m3 Ceiling (10 min)

Health Factors

HEALTH EFFECTS: Respiratory Sensitization (Asthma)

Monitoring

SLC1:

MEDIA: Glass Fiber Filter (37 mm open face) coated with 0.1 mg 1-(2-pyridyl)piperazine
ANL SOLVENT: 90/10 (v/v) Acetonitrile/Dimethylsulfoxide
MAX V: 15 Liters **MAX F:** 1.0 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV/FLU
REF: 2 (OSHA 42)
SAE: 0.18
CLASS: Fully Validated
NOTE: OSHA personnel may obtain filters from SLTC and refrigerate

until use.

COND: Column: Mobile Phase: Detector Wavelength: Detection Limit:

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 11/30/1998

NIOSH Pocket Guide to Chemical Hazards

Hexamethylene diisocyanate	CAS 822-06-0
$OCN[CH_2]_6NCO$	RTECS MO1740000
Synonyms & Trade Names 1,6-Diisocyanatohexane; HDI; Hexamethylene-1,6-diisocyanate; 1,6-Hexamethylene diisocyanate; HMDI	**DOT ID & Guide** 2281 156

Exposure Limits	NIOSH REL: TWA 0.005 ppm (0.035 mg/m^3) C 0.020 ppm (0.140 mg/m^3) [10-minute]
	OSHA PEL: none

IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 6.88 mg/m^3

Physical Description
Clear, colorless to slightly yellow liquid with a sharp, pungent odor.

MW: 168.2	BP: 415°F	FRZ: -89°F	Sol: Low (Reacts)
VP(77°F): 0.5 mmHg	IP:?		Sp.Gr(77°F): 1.04
Fl.P: 284°F	UEL: ?	LEL: ?	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Water, alcohols, strong bases, amines, carboxylic acids, organotin catalysts [Note: Reacts slowly with water to form carbon dioxide. Avoid heating above 392°F (polymerizes).]

Measurement Method
Impinger; Reagent; High-pressure liquid chromatography/Fluorescence/Electrochemical detection; IV [#5522, Isocyanates] [Also #5521] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: N.R. Provide: Eyewash, Quick drench	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH
Up to 0.05 ppm: (APF = 10) Any supplied-air respirator*
Up to 0.125 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 0.25 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 1 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms irritation eyes, skin, respiratory system; cough, dyspnea (breathing difficulty), bronchitis, wheezing, pulmonary edema, asthma; corneal damage, skin blisters
Target Organs Eyes, skin, respiratory system
See also: INTRODUCTION See ICSC CARD: 0278

International Chemical Safety Cards

METHYLENE BISPHENYL ISOCYANATE

ICSC: 0298

METHYLENE BISPHENYL ISOCYANATE
MDI
Diphenylmethane-4.4'-diisocyanate
bis(1,4-Isocyanatophenyl)methane
$C_{15}H_{10}N_2O_2/OCNC_6H_4CH_2C_6H_4NCO$
Molecular mass: 250.3

CAS # 101-68-8
RTECS # NQ9350000
ICSC # 0298
UN # 2489
EC # 615-005-01-6

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames.	Powder, carbon dioxide.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
• INHALATION	Headache. Nausea. Shortness of breath. Sore throat.	Ventilation (not if powder). Local exhaust or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
• SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
• EYES	Pain. May cause corneal damage.	Safety goggles or face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Sweep spilled substance into containers; if appropriate, moisten first to prevent dusting. Carefully collect remainder, then remove to safe place (extra personal protection: self-contained breathing apparatus).	Separated from incompatible materials (see Chemical Dangers), food and feedstuffs. Cool. Dry. Keep in the dark.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Xn symbol R: 20-36/37/38-42 S: (2-)26-28-38-45 Note: C UN Hazard Class: 6.1 UN Packing Group: III

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0298

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

METHYLENE BISPHENYL ISOCYANATE

ICSC: 0298

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** WHITE TO PALE YELLOW CRYSTALS OR FLAKES. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance may polymerize under the influence of temperatures above 204°C. On combustion, forms toxic and corrosive fumes including nitrogen oxides and hydrogen cyanide (see ICSC # 0492). Reacts readily with water to form insoluble polyureas. Reacts violently with acids, alcohols, amines, bases and oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: 0.005 ppm; 0.05 mg/m^3 as TWA (ACGIH 1992-1993).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** Tear drawing. The substance irritates the eyes, the skin and the respiratory tract. Inhalation of the substance may cause lung oedema (see Notes). **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma (see Notes).
PHYSICAL PROPERTIES	Boiling point at 100 kPa: 314°C Melting point: 37°C Relative density (water = 1): 1.2 Solubility in water: reaction	Vapour pressure, Pa at 20°C: negligible Relative vapour density (air = 1): 8.6 Flash point: 196°C c.c. Auto-ignition temperature: 240°C
ENVIRONMENTAL DATA		

NOTES

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance. MDI may sensitize workers so that they react to other isocyanates (asthma). Do NOT take working clothes home. Caradate 30, Desmodur 44, Hylene M 150, Isonate, Nacconate 300, NCI-C50668, Rubinate 44 are trade names.

Transport Emergency Card: TEC (R)-634

ADDITIONAL INFORMATION

ICSC: 0298 METHYLENE BISPHENYL ISOCYANATE

© IPCS, CEC, 1993

IMPORTANT LEGAL NOTICE: Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: METHYLENE BISPHENYL ISOCYANATE

CAS Number: 101-68-8
DOT Number: UN 2489

RTK Substance number: 1253
Date: May 1992 Revision: June 1998

HAZARD SUMMARY

* **Methylene Bisphenyl Isocyanate** can affect you when breathed in.
* Contact with **Methylene Bisphenyl Isocyanate** can irritate the skin, and may cause a rash and skin allergy.
* Exposure to **Methylene Bisphenyl Isocyanate** can irritate the eyes, nose, throat and lungs.
* **Methylene Bisphenyl Isocyanate** may cause an asthma-like allergy. Future exposures to very low concentrations can cause asthma attacks with shortness of breath, wheezing, coughing, and chest tightness.
* Repeated exposure may reduce lung function.

IDENTIFICATION

Methylene Bisphenyl Isocyanate is an odorless solid which appears as white to light-yellow flakes. It is used to manufacture polyurethane foams.

REASON FOR CITATION

* **Methylene Bisphenyl Isocyanate** is on the Hazardous Substance List because it is regulated by OSHA and cited by NIOSH, ACGIH, DOT, DEP, and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.02 ppm** not to be exceeded at any time.

NIOSH: The recommended airborne exposure limit is **0.005 ppm** averaged over a 10-hour workshift and **0.02 ppm** not to be exceeded during any 10 minute work period.

ACGIH: The recommended airborne exposure limit is **0.005 ppm** averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Methylene Bisphenyl Isocyanate.**
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Methylene Bisphenyl Isocyanate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methylene Bisphenyl Isocyanate**:

* Contact with **Methylene Bisphenyl Isocyanate** can irritate the skin and may cause a rash.
* Exposure to **Methylene Bisphenyl Isocyanate** can irritate the eyes, nose, throat and lungs causing coughing, wheezing, chest tightness and/or shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methylene Bisphenyl Isocyanate** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methylene Bisphenyl Isocyanate** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methylene Bisphenyl Isocyanate** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* **Methylene Bisphenyl Isocyanate** may cause an asthma-like allergy. If this occurs, future exposures to very low concentrations can cause asthma attacks with shortness of breath, wheezing, coughing, and chest tightness.
* Repeated exposure may reduce lung function causing shortness of breath.
* **Methylene Bisphenyl Isocyanate** may cause a skin allergy. If an allergy develops, very low future exposures can cause itching and a skin rash.

MEDICAL

Medical Testing

Before starting work and at regular times after that, the following may be useful:

* Lung function tests. These may be normal at first if the person is not having an attack at the time of the test.

If symptoms develop or overexposure is suspected, the following may be useful:

* Evaluation by a qualified allergist, including careful exposure history and special testing, may help diagnose allergy to **Methylene Bisphenyl Isocyanate**.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

* Persons with asthma may be at increased risk of health effects from exposure to **Methylene Bisphenyl Isocyanate**.
* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following control is recommended:

* Where possible, automatically transfer **Methylene Bisphenyl Isocyanate** from drums or other storage containers to process containers.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methylene Bisphenyl Isocyanate** should change into clean clothing promptly.

* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methylene Bisphenyl Isocyanate.**
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Methylene Bisphenyl Isocyanate,** immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where **Methylene Bisphenyl Isocyanate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Use a vacuum or a wet method to reduce dust during cleanup. DO NOT DRY SWEEP.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methylene Bisphenyl Isocyanate.** Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear dust-proof goggles and face shield when working with powders or dust, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **0.005 ppm,** use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **7.5 ppm** is immediately dangerous to life and health. If the possibility of exposures above **7.5 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **METHYLENE BISPHENYL ISOCYANATE**
DOT Number: **UN 2489**
NAERG Code: **156**
CAS Number: **101-68-8**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	1	-
REACTIVITY	2	-
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Use dry chemical or CO_2 extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methylene Bisphenyl Isocyanate** is spilled, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.
* Collect solid material in the most convenient and safe manner and deposit in sealed containers.
* Ventilate area after clean-up is complete.
* It may be necessary to contain and dispose of **Methylene Bisphenyl Isocyanate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE

* Prior to working with **Methylene Bisphenyl Isocyanate** you should be trained on its proper handling and storage.
* **Methylene Bisphenyl Isocyanate** must be stored to avoid contact with ALCOHOLS since violent reactions can occur.
* **Methylene Bisphenyl Isocyanate** is not compatible with WATER; ALKALIES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); ACIDS; STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); AMINES (such as METHYLAMINE, ANILINE and ETHYLENEDIAMINE); and AMMONIA.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT and MOISTURE.
* Keep the area at temperatures below 100°F (38°C).

FIRST AID

In NJ, POISON INFORMATION 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 0.05 mm Hg at 68°F (20°C)
Flash Point: 396°F (202°C)
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Isocyanic Acid, Methylenedi-p-Phenylene Ester
Other Names:
4,4'-Diphenylmethane Diisocyanate;
4,4'-Diisocyanatodiphenylmethane; MDI

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Methylene bisphenyl isocyanate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methylene bisphenyl isocyanate

SYNONYM(s): 4,4-Diphenylmethane diisocyanate; MDI; 4,4-Diisocyanadiphenyl-methane; Methylene bis(4-phenylisocyanate); Methylene Bis(Phenyl Isocyanate)

IMIS: 1073

CAS: 101-68-8

NIOSH: RTECS NQ9350000; 44210

DOT: UN2489 Keep Away From Food

DESCRIPTION:

White to light-yellow flakes; odorless.
MW: 250
BP: 342 F
VP: 0.05 mm
MP: 99 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 0.02 ppm, 0.2 mg/m3 Ceiling

OSHA CONSTRUCTION INDUSTRY STANDARDS: 0.02 ppm, 0.2 mg/m3 Ceiling

THRESHOLD LIMIT VALUE: 0.005 ppm, 0.051 mg/m3 TWA

RECOMMENDED EXPOSURE LIMIT: 0.005 ppm TWA; 0.020 ppm Ceiling (10 min)

Health Factors

IARC: Group 3, not classifiable as to its carcinogenicity to humans

SYMPTOM(s): Eye, nose, throat irritation; coughing, pulmonary secretions, chest pain, dyspnea, asthma

HEALTH EFFECTS: Asthma (HE9) Irritation-Eye, Nose, Throat, Skin---Marked (HE14)

ORGAN: Respiratory system, eyes

Monitoring

SLC1:

MEDIA: Coated Glass Fiber Filter (37 mm open face) Coated with 1.0 mg 1-(2-Pyridyl)piperazine
ANL SOLVENT: 90/10 (v/v) Acetonitrile/Dimethyl Sulfoxide
MIN T: 15 Minutes **MAX F:** 1.0 L/min (Ceiling)
ANL 1: High Performance Liquid Chromatography; HPLC/UV/FLU
REF: (OSHA 47)
SAE: 0.17
CLASS: Fully Validated
NOTE: OSHA personnel may obtain coated filter from SLTC and refrigerate until use.

COND: Column: Mobile Phase: Detector Wavelength: Detection Limit:

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 11/19/1992

NIOSH Pocket Guide to Chemical Hazards

Methylene bisphenyl isocyanate	CAS 101-68-8
$CH_2(C_6H_4NCO)_2$	RTECS NQ9350000
Synonyms & Trade Names 4,4'-Diphenylmethane diisocyanate; MDI; Methylene bis(4-phenyl isocyanate); Methylene di-p-phenylene ester of isocyanic acid	**DOT ID & Guide** 2489 156

Exposure Limits	NIOSH REL: TWA 0.05 mg/m^3 (0.005 ppm) C 0.2 mg/m^3 (0.020 ppm) [10-minute]
	OSHA PEL: C 0.2 mg/m^3 (0.02 ppm)
IDLH 75 mg/m^3 See: 101688	**Conversion** 1 ppm = 10.24 mg/m^3

Physical Description
White to light-yellow, odorless flakes. [Note: A liquid above 99°F.]

MW: 250.3	BP: 597°F	MLT: 99°F	Sol: 0.2%
VP(77°F): 0.000005 mmHg	IP: ?		Sp.Gr: 1.23 (Solid at 77°F) 1.19 (Liquid at 122°F)
Fl.P: 390°F	UEL: ?	LEL: ?	

Combustible Solid

Incompatibilities & Reactivities
Strong alkalis, acids, alcohol [Note: Polymerizes at 450°F.]

Measurement Method
Impinger; Reagent; High-pressure liquid chromatography/Fluorescence/Electrochemical detection; IV [#5522, Isocyanates] [Also #5521] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH

Up to 0.5 mg/m^3: (APF = 10) Any supplied-air respirator*

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

Up to 2.5 mg/m^3: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 75 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front-

or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus
Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms irritation eyes, nose, throat; respiratory sensitization; cough, pulmonary secretions, chest pain, dyspnea (breathing difficulty); asthma
Target Organs Eyes, respiratory system
See also: INTRODUCTION See ICSC CARD: 0298 See MEDICAL TESTS: 0147

Chemical Sampling Information
Isopropyl Alcohol

Chemical Sampling Information - Table of Contents

Field Definitions
Analytical Methods
Health Guidelines

General Description

NAME: Isopropyl Alcohol

SYNONYM(s): Isopropanol; IPA; 2-Propanol; sec-Propyl alcohol

IMIS: 1560

CAS: 67-63-0

NIOSH: RTECS NT8050000; 44675

DOT: UN1219 Flammable Liquid

DESCRIPTION:

Colorless liquid with an odor of rubbing alcohol.
MW: 60.09
BP: 180 F
VP: 33 mm
MP: -128 F

INCOM: Strong oxidizers

Exposure Limits

OSHA GENERAL INDUSTRY PEL: 400 ppm, 980 mg/m3

OSHA CONSTRUCTION INDUSTRY PEL: 400 ppm, 980 mg/m3 TWA

ACGIH TLV: 400 ppm TWA; 500 ppm STEL

NIOSH REL: 400 ppm TWA, 500 ppm STEL

Health Factors

IARC: Isopropyl Alcohol Manufacture (Strong-Acid Process) - Group 1, carcinogenic to humans

SYMPTOM(s): Mild eye, nose, throat irritation; drowsiness; dizziness; headaches; dry cracking skin

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Mild (HE16) Narcosis (HE8)

ORGAN: Eyes, skin, respiratory system

Monitoring

PRIMARY SAMPLING/ANALYTICAL METHOD (SLC1):

MEDIA: Two Anasorb 747 Tubes (400mg first/ 200mg second)
ANL SOLVENT: (60:40) Dimethylformamide/Carbon Disulfide
MAX V: 18 Liters **MAX F:** 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 109)
SAE: 0.08
CLASS: Fully Validated
NOTE: After sampling, separate and cap tubes. Label first and second.

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/2-Butanol
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide

ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 3 Liters **MAX F:** 0.2 L/min (TWA)
MAX V: 3 Liters **MAX F:** 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 1400)
SAE: 0.12
CLASS: Fully Validated .
NOTE: The use of charcoal may give low results from high humidity atmospheres due to an insoluble water phase in the sample solution.

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Gastec
PART #: 113L **RANGE:** 25-800 ppm
CLASS: Mfg
DEVICE: Detector Tube **COMPANY:** MSA
PART #: 95097 **RANGE:** 100-10,000 ppm
CLASS: Mfg
DEVICE: Detector Tube **COMPANY:** Kitagawa
PART #: 150U **RANGE:** 40-1,200 ppm
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Infrared Spectrophotometer
PART #: MIRAN 1A & 1B **RANGE:** 0.6 ppm @ 8.9 um
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Infrared Spectrophotometer
PART #: MIRAN 103 **RANGE:** 800 ppm @ 12.3 um
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** Organic Vapor Analyzer
PART #: Organic Vapor Analyzer
CLASS: Mfg
DEVICE: Instrumentation **COMPANY:** PID
PART #: Photoionization Detector
CLASS: Mfg

◀ Chemical Sampling Information - Table of Contents

Revision Date: 02/29/2000

* **All Trademarks are the property of their respective owners.**

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ISOPROPYL ALCOHOL (90 - 100%)

MSDS Number: I8840 --- *Effective Date: 07/21/00*

1. Product Identification

Synonyms: 2-Propanol; sec-propyl alcohol; isopropanol; sec-propanol; dimethylcarbinol
CAS No.: 67-63-0
Molecular Weight: 60.10
Chemical Formula: (CH3)2 CHOH
Product Codes:
J.T. Baker: 5082, 9037, 9080, U298
Mallinckrodt: 3027, 3031, 3032, 3035, 3037, 3043, 4359, 6569, H604, H982, V345, V555, V566

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Isopropyl Alcohol	67-63-0	90 - 100%	Yes
Water	7732-18-5	0 - 10%	No

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.
Ingestion:
Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).
Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 399C (750F)
Flammable limits in air % by volume:
lel: 2.0; uel: 12.7
Listed fire data is for Pure Isopropyl Alcohol.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB(R) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Isopropyl Alcohol (2-Propanol):
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA), 500 ppm (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Rubbing alcohol.
Solubility:
Miscible in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
82C (180F)
Melting Point:
-89C (-128F)
Vapor Density (Air=1):
2.1
Vapor Pressure (mm Hg):
44 @ 25C (77F)
Evaporation Rate (BuAc=1):
2.83

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.
Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Isopropyl Alcohol (67-63-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 355LB

International (Water, I.M.O.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3.2
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 355LB

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Isopropyl Alcohol (67-63-0)	No	No	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)

Isopropyl Alcohol (67-63-0)	No	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2[S]2
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 7.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its

comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

OSHA Chemical Sampling Information
Methyl Chloroform

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methyl Chloroform

SYNONYM(s): 1,1,1-Trichloroethane; Composite Constituent

IMIS: 1720

CAS: 71-55-6

NIOSH: RTECS KJ2975000; 34070

DOT: UN2831 Keep Away From Food

DESCRIPTION:

Colorless liquid with a mild, chloroform-like odor.
MW: 133
BP: 165 F
VP: 100 mm
MP: -36 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 350 ppm, 1900 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 350 ppm, 1900 mg/m3 TWA

THRESHOLD LIMIT VALUE: 350 ppm, 1910 mg/m3 TWA; 450 ppm, 2460 mg/m3 STEL; Appendix A4 (Not Classifiable as a Human Carcinogen)

RECOMMENDED EXPOSURE LIMIT: 350 ppm Ceiling (15 min)

Health Factors

IARC: Group 3, not classifiable as to its carcinogenicity to humans (1,1,1-Trichloroethane)

SYMPTOM(s): Headaches; lassitude; CNS depression; poor equilibrium; eye irritation; dermatitis; cardiac arrhythmias

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Mild (HE16) Narcosis (HE8)

ORGAN: Skin, CNS, CVS, eyes

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters **MAX F:** 0.2 L/min (TWA)
MAX V: 3 Liters **MAX F:** 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 2 (OSHA 14)
SAE: 0.11
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 135 **RANGE:** 100-500 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** MSA
PART #: 88536 **RANGE:** 100-700 ppm, Pyrolyzer required
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 160S **RANGE:** 15-400 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Draeger
PART #: CH 21101 **RANGE:** 50-600 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.2 ppm @ 9.3 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-1000 ppm @ 9.9 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** HNU
PART #: Photoionization Detector
CLASS: Mfg

◀ OSHA Chemical Sampling Information - Table of Contents

Revision Date: 01/12/1999

NIOSH Pocket Guide to Chemical Hazards

Methyl chloroform	**CAS** 71-55-6
CH_3CCl_3	**RTECS** KJ2975000
Synonyms & Trade Names Chlorothene; 1,1,1-Trichloroethane; 1,1,1-Trichloroethane (stabilized)	**DOT ID & Guide** 2831 160

Exposure Limits	NIOSH REL: C 350 ppm (1900 mg/m^3) [15-minute] See Appendix C (Chloroethanes)
	OSHA PEL†: TWA 350 ppm (1900 mg/m^3)
IDLH 700 ppm See: 71556	**Conversion** 1 ppm = 5.46 mg/m^3

Physical Description
Colorless liquid with a mild, chloroform-like odor.

MW: 133.4	BP: 165°F	FRZ: -23°F	Sol: 0.4%
VP: 100 mmHg	IP: 11.00 eV		Sp.Gr: 1.34
Fl.P: ?	UEL: 12.5%	LEL: 7.5%	

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities
Strong caustics; strong oxidizers; chemically-active metals such as zinc, aluminum, magnesium powders, sodium & potassium; water [Note: Reacts slowly with water to form hydrochloric acid.]

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1003, Halogenated Hydrocarbons] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact	Eye: Irrigate immediately
Eyes: Prevent eye contact	Skin: Soap wash promptly
Wash skin: When contaminated	Breathing: Respiratory support
Remove: When wet or contaminated	Swallow: Medical attention immediately
Change: N.R.	

Respirator Recommendations NIOSH/OSHA
Up to 700 ppm: (APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depressant/depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage

Target Organs Eyes, skin, central nervous system, cardiovascular system, liver

See also: INTRODUCTION See ICSC CARD: 0079 See MEDICAL TESTS: 0141

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

1,1,1-TRICHLOROETHANE

MSDS Number: T4914 --- *Effective Date: 04/09/98*

1. Product Identification

Synonyms: Methyl chloroform; trichloroethane; chloroetene
CAS No.: 71-55-6
Molecular Weight: 133.40
Chemical Formula: CH3CCl3
Product Codes: 5381, 9435, 9436, 9437, W509, W510

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Chloroform	71-55-6	96 - 100%	Yes
Dioxane	123-91-1	< 3%	Yes
1,2-Epoxybutane	106-88-7	< 0.5%	Yes
Actual concentrations proprietary			

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Inhalation of vapors will irritate the respiratory tract. Affects the central nervous system. Symptoms include headache, dizziness, weakness, nausea. Higher levels of exposure (> 5000 ppm) can cause irregular heart beat, kidney and liver damage, fall in blood pressure, unconsciousness and even death.
Ingestion:
Harmful if swallowed. Symptoms similar to inhalation will occur along with nausea, vomiting. Aspiration of material into the lungs can cause chemical pneumonitis which can be fatal. If aspirated, may be rapidly absorbed through the lungs and result in injury to other body systems.
Skin Contact:
Causes mild irritation and redness, especially on prolonged contact. Repeated contact may cause drying or flaking of the skin.
Eye Contact:
Liquids and vapors cause irritation. Symptoms include tearing, redness, stinging, swelling.
Chronic Exposure:
Prolonged or repeated skin contact may cause dermatitis. Chronic exposure may affect the kidneys and liver. Dioxane is a suspected human carcinogen based on animal data.
Aggravation of Pre-existing Conditions:
Personnel with CNS, kidney, liver or heart disease may be more susceptible to the effects of this substance. Use of alcoholic beverages may aggravate symptoms.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 500C (932F)
Flammable limits in air % by volume:
lel: 7.0; uel: 16.0
Vapors in containers can explode if subjected to high energy source.
Dioxane has a flash point below 16C (60F).
Explosion:
Can react with strong caustic, such as potash to form a flammable or explosive material. Air/vapor mixtures may explode when heated. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! Do not use aluminum, magnesium or zinc metal for storage container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not use aluminum equipment or storage containers. Contact with aluminum parts in a pressurized fluid system may cause violent reactions.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
350 ppm (TWA) for trichloroethane

100 ppm (TWA) skin for dioxane
-ACGIH Threshold Limit Value (TLV):
350 ppm (TWA), 450 ppm (STEL) for trichloroethane
25 ppm (TWA) skin A3 - Animal Carcinogen for dioxane
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has questionable warning properties.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Viton is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Mild chloroform-like odor.
Solubility:
4,400 ppm in water @ 20C (68F)
Specific Gravity:
1.34 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
74C (165F)
Melting Point:
-32C (-26F)
Vapor Density (Air=1):
4.63
Vapor Pressure (mm Hg):
100 @ 20C (68F)
Evaporation Rate (BuAc=1):
12.8

---

10. Stability and Reactivity

Stability:
Requires inhibitor content to prevent corrosion of metals. Slowly hydrolyzes in water to

form hydrochloric and acetic acid.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition. Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Hazardous polymerization can occur in contact with aluminum trichloride.
Incompatibilities:
Open flames, welding arcs, nitrogen tetroxide, oxygen, liquid oxygen, sodium, sodium hydroxide, and sodium-potassium alloy, strong alkalis, oxidizers, aluminum and other reactive metals.
Conditions to Avoid:
Insufficient inhibitor, incompatibles, heat, flame and ignition sources

11. Toxicological Information

Oral rat LD50: 9600 mg/kg; inhalation rat LC50: 18000 ppm/4H; investigated as a mutagen, tumorigen, reproductive effector; irritation eye rabbit, Standard Draize, 2mg/24H severe.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Chloroform (71-55-6)	No	No	3
Dioxane (123-91-1)	No	Yes	2B
1,2-Epoxybutane (106-88-7)	No	No	3

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released to the atmosphere, this material has an average global half-life of 6.0 - 6.9 years. When released into the air, this material may adversely affect the ozone layer.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal

disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1
UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

International (Air, I.C.A.O.)

Proper Shipping Name: 1,1,1-TRICHLOROETHANE
Hazard Class: 6.1
UN/NA: UN2831
Packing Group: III
Information reported for product/size: 20L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Methyl Chloroform (71-55-6)	Yes	Yes	Yes	Yes
Dioxane (123-91-1)	Yes	Yes	Yes	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Chloroform (71-55-6)	Yes	Yes	No	Yes
Dioxane (123-91-1)	Yes	Yes	No	Yes
1,2-Epoxybutane (106-88-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Chloroform (71-55-6)	No	No	Yes	No
Dioxane (123-91-1)	No	No	Yes	No
1,2-Epoxybutane (106-88-7)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Chloroform (71-55-6)	1000	U226	No
Dioxane (123-91-1)	100	U108	No
1,2-Epoxybutane (106-88-7)	100	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 2[Z]
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, AND CARDIOVASCULAR SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE CANCER HAZARD. CONTAINS DIOXANE WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Avoid breathing vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS

INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **METHYL CHLOROFORM**

CAS Number: 71-55-6
DOT Number: UN 2831

RTK Substance number: 1237
Date: May 1986 Revision: September 1994

HAZARD SUMMARY

* **Methyl Chloroform** can affect you when breathed in and by passing through your skin.
* It may cause mutations. Handle with extreme caution.
* Contact can irritate the skin and eyes.
* Prolonged contact can cause thickening and cracking of the skin.
* Exposure can cause headache, dizziness and light-headedness. Higher levels can cause irregular heartbeat and even coma.
* **Methyl Chloroform** may damage the liver and kidneys.

IDENTIFICATION

Methyl Chloroform is a colorless liquid. It is used as a cleaning solvent in vapor degreasing, coatings, ink production and dry cleaning.

REASON FOR CITATION

* **Methyl Chloroform** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, NIOSH, NFPA, DOT, DEP, IARC, HHAG and EPA.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer. If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 390 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **350 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **350 ppm**, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **350 ppm** averaged over an 8-hour workshift and **450 ppm** as a STEL (short term exposure limit).

* **Methyl Chloroform** may cause mutations. All contact with this chemical should be reduced to the lowest possible level.
* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Methyl Chloroform** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Methyl Chloroform** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methyl Chloroform**:

* Contact can irritate the skin and eyes.
* Exposure can cause headache, dizziness and light-headedness. Higher levels can cause irregular heartbeat and even coma.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methyl Chloroform** and can last for months or years:

Cancer Hazard

* **Methyl Chloroform** may cause mutations (genetic changes). Whether or not it poses a cancer risk needs further study.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methyl Chloroform** has been tested and has not been shown to affect reproduction.

Other Long-Term Effects

* **Methyl Chloroform** may damage the liver and kidneys.
* Prolonged contact can cause thickening and cracking of the skin.

MEDICAL

Medical Testing

If symptoms develop or overexposure is suspected, the following may be useful:

* Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Methyl Chloroform** from drums or otherstorage containers to process containers.
* Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document: *1,1,1-Trichloroethane #76-184.*

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methyl Chloroform** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methyl Chloroform**.
* Eye wash fountains should be provided in the immediate work area for emergency use.

* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Methyl Chloroform**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Methyl Chloroform**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Methyl Chloroform** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.
* Do not smoke in the work area. Even a little vapor inhaled through a burning cigarette, cigar, or pipe will be converted into more highly toxic substances.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methyl Chloroform**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Viton* or *Polyvinyl Alcohol* as protective materials.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **350 ppm**, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **1,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **1,000 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Methyl Chloroform** you should be trained on its proper handling and storage.
* **Methyl Chloroform** must be stored to avoid contact with SODIUM, POTASSIUM, ACETONE, NITRITES and OXYGEN since violent reactions occur.
* **Methyl Chloroform** is not compatible with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE), ALUMINUM, ALUMINUM ALLOYS, MAGNESIUM, and ZINC.
* **Methyl Chloroform** reacts slowly with WATER to form *HYDROCHLORIC ACID*.
* Do not allow vapor near sources of ultra-violet light (such as arc welding) because poisonous gases may be produced.
* Store in tightly closed containers in a cool, well-ventilated area away from HEAT, WATER, and MOISTURE.
* DO NOT USE ALUMINUM CONTAINERS.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>EMERGENCY INFORMATION<<<<<<<<<<<<<<<<<<

Common Name: **METHYL CHLOROFORM**
DOT Number: **UN 2831**
NAERG Code: **1604**
CAS Number: **71-55-6**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	1
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Methyl Chloroform** is a non-combustible liquid, however, **Methyl Chloroform** vapor will burn.
* Use dry chemical, CO_2, water spray, or foam extinguishers.
* Water can be used to keep fire-exposed containers cool.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Hydrogen Chloride* and *Phosgene.*
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methyl Chloroform** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Ventilate area of spill or leak.
* Cover liquids with dry lime or soda ash and deposit in sealed containers.
* It may be necessary to contain and dispose of **Methyl Chloroform** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environ-mental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

==========

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

==========

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 100 mm Hg at 68°F (20°C)
Water Solubility: Insoluble

OTHER COMMONLY USED NAMES

Chemical Name:
Ethane, 1,1,1-Trichloro-
Other Names:
Chlorothene NU; Chlorothene VG; Methyltrichloromethane; 1,1,1-Trichloroethane

---

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

PROPYLENE GLYCOL

MSDS Number: P6928 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: 1,2-propanediol; 1,2-dihdroxypropane; methyl glycol; methylethylene glycol
CAS No.: 57-55-6
Molecular Weight: 76.09
Chemical Formula: CH3CHOHCH2OH
Product Codes: J.T. Baker: 9402, U510 Mallinckrodt: 1925, 6263

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Propylene Glycol	57-55-6	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate

ctive Equip: GOGGLES; LAB COAT
or Code: Orange (General Storage)

---

l Health Effects

---

nhalation:
No adverse health effects via inhalation.

Ingestion:
Relatively non-toxic. Ingestion of sizable amount (over 100ml) may cause some gastrointestinal upset and temporary central nervous system depression. Effects appear more severe in individuals with kidney problems.

Skin Contact:
Mild irritant and defatting agent, especially on prolonged contact.

Eye Contact:
May cause transitory stinging and tearing.

Chronic Exposure:
Lactic acidosis, stupor and seizures have been reported following chronic ingestion.

Aggravation of Pre-existing Conditions:
Kidney disorders.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. Not expected to require first aid measures.

Ingestion:
Not expected to require first aid measures. Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Call a physician if irritation persists.

Note to Physician:
In case of ingestion, monitor for acidosis and central nervous system changes. Exposed persons with previous kidney dysfunction may require special treatment.

---

5. Fire Fighting Measures

Fire:
Flash point: 99C (210F) CC Autoignition temperature: 371C (700F) Flammable limits in

air % by volume: lel: 2.6; uel: 12.5 Material can support combustion.

Explosion:
Containers may explode in heat or fire.

Fire Extinguishing Media:
Dry chemical, foam, water or carbon dioxide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Move exposed containers from fire area, if it can be done without risk. Use water to keep fire-exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

7. Handling and Storage

Protect container from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture, and incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
AIHA Workplace Environmental Exposure Level (WEEL): Vapor and Aerosol = 50ppm; Aerosol, only = 10mg/m3.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face respirator with an organic vapor cartridge and dust/mist filter may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece respirator with an organic vapor cartridge and

filter may be worn up to 50 times the exposure limit, or the maximum use ion specified by the appropriate regulatory agency or respirator supplier, er is lowest. For emergencies or instances where the exposure levels are not n, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-ifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.

Odor:
Odorless.

Solubility:
Miscible in water.

Specific Gravity:
0.0361 @ 20C/4C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
No information found.

Boiling Point:
188.2C (370F)

Melting Point:
-59C (-74F)

Vapor Density (Air=1):
2.6

Vapor Pressure (mm Hg):
0.129 @ 25C (77F)

Evaporation Rate (BuAc=1):
0.01

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition. Aldehydes or lactic, pyruvic or acetic acids may also be formed.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 20g/kg. Skin rabbit LD50: 20.8g/kg. Irritation: Eye rabbit/Draize, 500 mg/24H mild. Investigated as a mutagen and reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Propylene Glycol (57-55-6)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Propylene Glycol (57-55-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Propylene Glycol (57-55-6)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Propylene Glycol (57-55-6)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Propylene Glycol (57-55-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 0 **Flammability:** 1 **Reactivity:** 0

Label Hazard Warning:
CAUTION! MAY CAUSE IRRITATION TO SKIN AND EYES.

Label Precautions:
Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. Call a physician if irritation develops or persists.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

OSHA Chemical Sampling Information
Propylene Glycol

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Propylene Glycol

IMIS: P108

CAS: 57-55-6

Exposure Limits

Health Factors

Monitoring

SLC1:

MEDIA: OSHA Versatile Sampler (OVS-7) - 13 mm XAD-7 tube (270/140 mg sections, 20/60 mesh) with a Glass Fiber Filter enclosed
ANL SOLVENT: Methanol
MAX V: 60 L **MAX F:** 2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 5523)
CLASS: Partially Validated
NOTE: Ship cold to the laboratory for analysis.

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 12/26/1996

NIOSH Pocket Guide to Chemical Hazards

Petroleum distillates (naphtha)	CAS 8002-05-9
	RTECS SE7449000
Synonyms & Trade Names Aliphatic petroleum naphtha, Petroleum naphtha, Rubber solvent	**DOT ID & Guide** 1255 128

Exposure Limits	NIOSH REL: TWA 350 mg/m^3 C 1800 mg/m^3 [15-minute]
	OSHA PEL†: TWA 500 ppm (2000 mg/m^3)
IDLH 1100 ppm [10%LEL] See: 8002059	**Conversion** 1 ppm = 4.05 mg/m^3

Physical Description
Colorless liquid with a gasoline- or kerosene-like odor. [Note: A mixture of paraffins (C5 to C13) that may contain a small amount of aromatic hydrocarbons.]

MW: 99 (approx)	BP: 86-460°F	FRZ: -99°F	Sol: Insoluble
VP: 40 mmHg (approx)	IP: ?		Sp.Gr: 0.63-0.66
Fl.P: -40 to -86°F	UEL: 5.9%	LEL: 1.1%	

Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1550, Naphthas] See: NMAM INDEX

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact	Eye: Irrigate immediately
Eyes: Prevent eye contact	Skin: Soap wash promptly
Wash skin: When contaminated	Breathing: Respiratory support
Remove: When wet (flammable)	Swallow: Medical attention immediately
Change: N.R.	

Respirator Recommendations NIOSH
Up to 850 ppm: (APF = 10) Any supplied-air respirator
Up to 1100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose, throat; dizziness, drowsiness, headache, nausea; dry cracked skin; chemical pneumonia (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

N-BUTYL ACETATE

MSDS Number: B6184 --- *Effective Date: 09/08/97*

1. Product Identification

Synonyms: 1-Butyl acetate; butyl ethanoate; acetic acid, n-butyl ester
CAS No.: 123-86-4
Molecular Weight: 112
Chemical Formula: C6H12O2
Product Codes:
J.T. Baker: 5365, 5681, 9159, 9161, 9164, 9171, 9173, 9191, D683
Mallinckrodt: 1820

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
n-Butyl Acetate	123-86-4	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE IRRITATION TO EYES. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations have a narcotic effect.
Ingestion:
Irritant to tissues. Sore throat, abdominal pain, nausea, vomiting, diarrhea are the symptoms. Expected to have a narcotic effect. One ounce may produce severe poisoning.

Skin Contact:
This material degreases the skin. Irritation and discoloration of the skin are symptoms. Skin allergy occasionally develops. Persons who have become allergic can develop rash upon future exposure to low levels.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Repeated or prolonged skin contact may defat the skin and produce irritation and dermatitis. Kidney and liver damage are reported in animals.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 26C (79F) CC

Autoignition temperature: 425C (797F)
Flammable limits in air % by volume:
lel: 1.7; uel: 7.6
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):

150 ppm (TWA)
- ACGIH Threshold Limit Value (TLV)
150 ppm (TWA), 200 ppm (STEL),
A4, Not Classifiable as a Human Carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.
WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Maintain eye wash fountain and quick-drench facilities in work area. Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Mild, fruity odor.

Solubility:
Slightly soluble in water (ca. 0.7% @ 20C)

Specific Gravity:
0.8822 at 20C/20C

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
126C (259F)

Melting Point:
-77C (-107F)

Vapor Density (Air=1):
4.0

Vapor Pressure (mm Hg):
15 @ 25C (77F)

Evaporation Rate (BuAc=1):
1

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Dangerous when exposed to heat or flame; can react with oxidizing materials, strong alkalis, acids, nitrates and potassium-tert-butoxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

---

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 10.8 g/kg; inhalation rat LC50: 2000 ppm/4H; Skin rabbit LD50: 17,600 mg/kg; Irritant, skin rabbit (Std. Draize): 500 mg/24H, moderate. Irritant, eye rabbit: 20 mg open, severe. Investigated as a reproductive effector.
Reproductive Toxicity:
Has shown teratogenic effects in laboratory animals.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
n-Butyl Acetate (123-86-4)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to have a half-life of less than 1 day. When released into water, this material is expected to readily biodegrade. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an estimated bioconcentration factor (BCF) of less than 100. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal

regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: BUTYL ACETATES
Hazard Class: 3
UN/NA: UN1123
Packing Group: III
Information reported for product/size: 400LB

International (Water, I.M.O.)

Proper Shipping Name: BUTYL ACETATES
Hazard Class: 3.3
UN/NA: UN1123
Packing Group: III
Information reported for product/size: 400LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
n-Butyl Acetate (123-86-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
n-Butyl Acetate (123-86-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
n-Butyl Acetate (123-86-4)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
n-Butyl Acetate (123-86-4)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 3[Y]E
Poison Schedule: No information found.
WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 Flammability: 3 Reactivity: 0
Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE IRRITATION TO EYES. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Avoid breathing vapor.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 1, 5, 7, 8, 11, 16.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **n-BUTYL ACETATE**

CAS Number: 123-86-4
DOT Number: UN 1123

RTK Substance number: 1329
Date: February 1989 Revision: December 1994

HAZARD SUMMARY

* **n-Butyl Acetate** can affect you when breathed in and by passing through your skin.
* **n-Butyl Acetate** can cause reproductive damage. Handle with extreme caution.
* Skin and eye contact can cause severe irritation and burns. Prolonged exposure can cause rash, dryness and cracking of the skin.
* Breathing **n-Butyl Acetate** can irritate the nose, throat and lungs, causing coughing and shortness of breath.
* **n-Butyl Acetate** may cause an acne-like rash following skin contact.
* Repeated exposure may affect the nervous system.
* **n-Butyl Acetate** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

n-Butyl Acetate is a colorless liquid with a fruity odor. It is an industrial solvent used in making lacquers, artificial leather, photographic films, plastics and safety glasses, and as a flavoring.

REASON FOR CITATION

* **n-Butyl Acetate** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NFPA, NIOSH and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.063 to 7.4 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **150 ppm** averaged over an 8-hour workshift.

ACGIH: The recommended airborne exposure limit is **150 ppm** averaged over an 8-hour workshift and **200 ppm** as a STEL (short term exposure limit).

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **n-Butyl Acetate** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **n-Butyl Acetate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **n-Butyl Acetate**:

* Skin and eye contact can cause severe irritation and burns.
* Breathing **n-Butyl Acetate** can irritate the nose, throat, and lungs, causing coughing and shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **n-Butyl Acetate** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **n-Butyl Acetate** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* **n-Butyl Acetate** has been shown to damage the developing fetus in animals.

Other Long-Term Effects

* Prolonged exposure can cause rash, dryness and cracking of the skin.
* **n-Butyl Acetate** may cause an acne-like rash following skin contact.
* Repeated exposure may affect the nervous system causing headache, nausea, dizziness, muscle weakness, contusion and even passing out.
* Very irritating substances may affect the lungs. It is not known whether **n-Butyl Acetate** causes lung damage.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

* Lung function tests.

If symptoms develop or overexposure is suspected, the following may be useful:

* Exam of the nervous system.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **n-Butyl Acetate** from drums or other storage containers to process containers.
* Before entering a confined space where **n-Butyl Acetate** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **n-Butyl Acetate** should change into clean clothing promptly.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **n-Butyl Acetate.**
* On skin contact with **n-Butyl Acetate**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **n-Butyl Acetate**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **n-Butyl Acetate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **n-Butyl Acetate**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Polyvinyl Alcohol* as a protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **150 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **n-Butyl Acetate**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **10,000 ppm** is immediately dangerous to life and health. If the possibility of exposure above **10,000 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **n-Butyl Acetate** you should be trained on its proper handling and storage.
* **n-Butyl Acetate** must be stored to avoid contact with OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE), STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC), and STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) as the reaction may cause fire and explosions.

* Sources of ignition, such as smoking and open flames, are prohibited where **n-Butyl Acetate** is handled, used, or stored.
* Metal containers involving the transfer of 5 gallons or more of **n-Butyl Acetate** should be grounded and bonded. Drums must be equipped with self-closing valves, pressure vacuum bungs, and flame arresters.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **n-Butyl Acetate**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

Q: Who is at the greatest risk from reproductive hazards?
A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **n-BUTYL ACETATE**
DOT Number: **UN 1123**
NAERG Code: **26**
CAS Number: **123-86-4**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
FLAMMABLE POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **n-Butyl Acetate** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, water spray or alcohol foam extinguishers.
* Use water as fog only, as solid streams of water may spread fire.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* Vapors are heavier than air and may travel to a source of ignition and flash back.
* Use water spray to keep fire-exposed containers cool.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **n-Butyl Acetate** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Cover liquids with dry lime, sand, or soda ash and deposit in sealed containers.
* Keep **n-Butyl Acetate** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **n-Butyl Acetate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention promptly.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 8 mm Hg at 68°F (20°C)
Flash Point: 72°F (22°C)
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Acetic Acid, Butyl Ester
Other Names:
Butyl Acetate; 1-Butyl Acetate; Butyl Ethanoate

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
n-Butyl Acetate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: n-Butyl Acetate

SYNONYM(s): Butyl Acetate; Butyl ethanoate; Acetic acid butyl ester

IMIS: 0440

CAS: 123-86-4

NIOSH: RTECS AF7350000; 1829

DOT: UN1123 Flammable Liquid

DESCRIPTION:

Colorless liquid with a fruity odor.
MW: 116
BP: 260 F
VP: 10 mm
MP: -101 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 150 ppm, 710 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 150 ppm, 710 mg/m3 TWA

THRESHOLD LIMIT VALUE: 150 ppm, 713 mg/m3 TWA; 200 ppm, 950 mg/m3 STEL

RECOMMENDED EXPOSURE LIMIT: 150 ppm TWA, 200 ppm STEL

Health Factors

SYMPTOM(s): Headaches, drowsiness; dryness and irritation of eyes, upper respiratory system, skin

HEALTH EFFECTS: Irritation-Eye, Nose, Throat---Moderate (HE15); Narcosis (HE8)

ORGAN: Eyes, skin, respiratory system

Monitoring

A: Charcoal Tube (100/50 mg sections, 20/40 mesh)
SOLVENT: Carbon Disulfide
SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters **MAX F:** 0.2 L/min (TWA)
MAX V: 3 Liters **MAX F:** 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 1450)
SAE: 0.11
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 142 **RANGE:** 0.01-0.8%
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 138U **RANGE:** 15-400 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.07 ppm @ 8.2 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 103 **RANGE:** 0-200 ppm @ 9.5 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 08/24/1992

NIOSH Pocket Guide to Chemical Hazards

n-Butyl acetate	**CAS** 123-86-4
$CH_3COO[CH_2]_3CH_3$	**RTECS** AF7350000
Synonyms & Trade Names Butyl acetate, n-Butyl ester of acetic acid, Butyl ethanoate	**DOT ID & Guide** 1123 129

Exposure Limits	NIOSH REL: TWA 150 ppm (710 mg/m^3) ST 200 ppm (950 mg/m^3)
	OSHA PEL†: TWA 150 ppm (710 mg/m^3)
IDLH 1700 ppm [10%LEL] See: 123864	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 116.2	BP: 258°F	FRZ: -107°F	Sol: 1%
VP: 10 mmHg	IP: 10.00 eV		Sp.Gr: 0.88
Fl.P: 72°F	UEL: 7.6%	LEL: 1.7%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1450, Esters I] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 10) Any supplied-air respirator*
Up to 1700 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, upper respiratory system; headache, drowsiness, narcosis
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0399

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ACETATE

MSDS Number: M2743 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Acetic acid, methyl ester
CAS No.: 79-20-9
Molecular Weight: 74
Chemical Formula: CH3COOCH3
Product Codes: Q007

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Acetate	79-20-9	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. HARMFUL OR FATAL IF SWALLOWED. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors causes irritation to the eyes, nose, and respiratory tract. Vapors have a narcotic effect, producing symptoms of dizziness, depression, shortness of breath, and irregular heartbeat. High concentrations can cause CNS depression characterized by eye inflammation, nervous irritation, chest tightness, headache, dizziness, drowsiness, difficulty breathing, palpitation, and conjunctivitis.

Ingestion:
May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.

Skin Contact:
Causes loss of natural oils and skin irritation.

Eye Contact:
Vapors can cause irritation with redness, tearing, and pain. A severe irritant to the eyes from liquid splashes.

Chronic Exposure:
Repeated contact with the liquid may cause dryness, cracking, and skin irritation. Causes eye irritation. Affects the central nervous system. Chronic effects may be similar to those from methanol exposure because methyl acetate can be hydrolyzed yielding methanol and acetic acid. Optic nerve damage is the predominant hazard.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye problems, impaired respiratory function or central nervous system conditions may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

---

5. Fire Fighting Measures

Fire:
Flash point: -10C (14F) CC Autoignition temperature: 454C (849F) Flammable limits in air % by volume: lel: 3.1; uel: 16 Extremely Flammable. Dangerous fire hazard when exposed to heat, flame, or oxidizers.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back. This highly flammable liquid must be kept from sparks, open flame, hot surfaces, and all sources of heat and ignition.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions

listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL): 200 ppm (TWA) - ACGIH Threshold Limit Value (TLV): 200 ppm (TWA) 250 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless liquid.

Odor:
Pleasant, fruity odor.

Solubility:
32g/100g water @ 20C (68F).

Specific Gravity:
0.9342

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
58C (136F)

Melting Point:
-99C (-146F)

Vapor Density (Air=1):
2.6

Vapor Pressure (mm Hg):
170 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable at room temperature in sealed containers.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Nitrates, strong oxidizers, alkalis, and acids. Reacts slowly with water to form acetic acid and methanol.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rabbit LD50:> 5 gm/kg. Skin rabbit LD50: > 5 gm/kg. Irritation data : Skin rabbit (Standard Draize) 500 mg/24H, mild. Eye rabbit (Standard Draize) 100 mg/24H, moderate. Investigated as a mutagen.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Acetate (79-20-9)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. This material has an estimated bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material is expected to have a half-life of greater than 30 days.

Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHYL ACETATE
Hazard Class: 3
UN/NA: UN1231
Packing Group: II
Information reported for product/size: 500ML

International (Water, I.M.O.)

Proper Shipping Name: METHYL ACETATE
Hazard Class: 3.2
UN/NA: UN1231
Packing Group: II
Information reported for product/size: 500ML

International (Air, I.C.A.O.)

Proper Shipping Name: METHYL ACETATE
Hazard Class: 3.2
UN/NA: UN1231
Packing Group: II
Information reported for product/size: 500ML

---

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Methyl Acetate (79-20-9)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Acetate (79-20-9)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Acetate (79-20-9)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Acetate (79-20-9)	No	No	Yes

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[S]E
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 1 **Flammability:** 3 **Reactivity:** 0

Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. HARMFUL OR FATAL IF SWALLOWED. AFFECTS CENTRAL NERVOUS SYSTEM.

Label Precautions:
Keep away from heat, sparks and flame. Keep container closed. Avoid breathing vapor. Use only with adequate ventilation. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15

minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **METHYL ACETATE**

CAS Number: 79-20-9
DOT Number: UN 1231

RTK Substance number: 1217
Date: September 1986 Revision: December 1996

HAZARD SUMMARY

* **Methyl Acetate** can affect you when breathed in and by passing through your skin.
* Contact can irritate and burn the eyes with possible permanent damage.
* Breathing **Methyl Acetate** can irritate the nose and throat.
* Breathing **Methyl Acetate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Exposure can cause dizziness, lightheadedness, headache, nausea and passing out.
* **Methyl Acetate** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Methyl Acetate is a colorless liquid with a fruity odor. It is used as a solvent in lacquers and paint removers and to make pharmaceuticals.

REASON FOR CITATION

* **Methyl Acetate** is on the Hazardous Substance List because it is regulated by OSHA and cited by DOT, NFPA, ACGIH and NIOSH.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from your employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 4.6 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **200 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **200 ppm** averaged over a 10-hour workshift <u>and</u> **250 ppm** not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **200 ppm** averaged over an 8-hour workshift <u>and</u> **250 ppm** as a STEL (short term exposure limit).

* The above exposure limits are for <u>air levels only</u>. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly <u>immediately</u> after exposure to **Methyl Acetate** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Methyl Acetate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Methyl Acetate**:

* Contact can irritate and burn the eyes.
* Breathing **Methyl Acetate** can irritate the nose and throat.
* Breathing **Methyl Acetate** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Exposure can cause dizziness, lightheadedness, headache, nausea and passing out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Methyl Acetate** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methyl Acetate** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Methyl Acetate** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* Repeated exposure may cause eye damage with possible loss of vision.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

* Lung function tests.
* Vision exam.

If symptoms develop or overexposure is suspected, the following may be useful:

* Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Methyl Acetate** from drums or other storage containers to process containers.
* Before entering a confined space where **Methyl Acetate** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Methyl Acetate** should change into clean clothing promptly.

* Do not take contaminated work clothes home. Family members could be exposed.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Methyl Acetate**.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Methyl Acetate**, immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where **Methyl Acetate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Methyl Acetate**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/ manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **200 ppm**, use a MSHA/NIOSH approved full facepiece respirator with an organic vapor cartridge/canister. Greater protection is provided by a powered-air purifying respirator.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Methyl Acetate**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Exposure to **3,100 ppm** is immediately dangerous to life and health. If the possibility of exposure above **3,100 ppm** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Methyl Acetate** you should be trained on its proper handling and storage.
* **Methyl Acetate** must be stored to avoid contact with STRONG OXIDIZERS (such as CHLORINE, BROMINE and FLUORINE), and STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC) since violent reactions occur.
* Store in tightly closed containers in a cool, well-ventilated area away from strong ALKALIS and NITRATES.
* Sources of ignition, such as smoking and open flames, are prohibited where **Methyl Acetate** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Methyl Acetate**.
* Metal containers involving the transfer of **Methyl Acetate** should be grounded and bonded.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?

A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **METHYL ACETATE**
DOT Number: **UN 1231**
NAERG Code: **129**
CAS Number: **79-20-9**

Hazard rating	NJ DOH	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Methyl Acetate** is a FLAMMABLE LIQUID.
* Use dry chemical, CO_2, water spray, or alcohol foam extinguishers.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Carbon Monoxide*.
* CONTAINERS MAY EXPLODE IN FIRE.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Methyl Acetate** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* Absorb liquids in vermiculite, dry sand, earth, or a similar material and deposit in sealed containers.
* Keep **Methyl Acetate** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the buildup of explosive concentrations.
* It may be necessary to contain and dispose of **Methyl Acetate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 173 mm Hg at 68°F (20°C)
Flash Point: 14°F (-10°C)
Water Solubility: Soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Acetic Acid, Methyl Ester
Other Names:
Methyl Ethanoate; Devoton; Tereton

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

OSHA Chemical Sampling Information
Methyl Acetate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Methyl Acetate

SYNONYM(s): Acetic acid, methyl ester; Methyl acetic ester; Methyl ethanoate

IMIS: 1650

CAS: 79-20-9

NIOSH: RTECS AI9100000; 2582

DOT: UN1231 Flammable Liquid

DESCRIPTION:

Colorless liquid with a fruity odor.
MW: 74
BP: 57 C
VP: 173 mm
MP: Solidifies at -98 C

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 610 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 610 mg/m3 TWA

THRESHOLD LIMIT VALUE: 200 ppm, 606 mg/m3 TWA; 250 ppm, 757 mg/m3 STEL

RECOMMENDED EXPOSURE LIMIT: 200 ppm TWA, 250 ppm STEL

Health Factors

SYMPTOM(s): Nose, throat irritation; headaches; drowsiness; optic atrophy

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Mild (HE16) Narcosis (HE8); CNS effects (HE7)

ORGAN: Respiratory system, skin, eyes

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 7 Liters **MAX F:** 0.2 L/min (TWA)
MAX V: 3 Liters **MAX F:** 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH S-42)
SAE: 0.09
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Kitagawa
PART #: 148 **RANGE:** 0.01-3.0%
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.3 ppm @ 9.6 um
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Century
PART #: Organic Vapor Analyzer
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 08/24/1992

NIOSH Pocket Guide to Chemical Hazards

Methyl acetate	CAS 79-20-9
CH_3COOCH_3	RTECS AI9100000
Synonyms & Trade Names Methyl ester of acetic acid, Methyl ethanoate	**DOT ID & Guide** 1231 129

Exposure Limits	NIOSH REL: TWA 200 ppm (610 mg/m^3) ST 250 ppm (760 mg/m^3)
	OSHA PEL†: TWA 200 ppm (610 mg/m^3)
IDLH 3100 ppm [10%LEL] See: 79209	**Conversion** 1 ppm = 3.03 mg/m^3

Physical Description
Colorless liquid with a fragrant, fruity odor.

MW: 74.1	BP: 135°F	FRZ: -145°F	Sol: 25%
VP: 173 mmHg	IP: 10.27 eV		Sp.Gr: 0.93
Fl.P: 14°F	UEL: 16%	LEL: 3.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids; water [Note: Reacts slowly with water to form acetic acid & methanol.]

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1458] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) */(APF = 10) Any supplied-air respirator*
Up to 3100 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact
Symptoms irritation eyes, skin, nose, throat; headache, drowsiness; optic nerve atrophy; chest tightness; in animals: narcosis
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0507

International Chemical Safety Cards

ISOBUTYL ACETATE

ICSC: 0494

ISOBUTYL ACETATE
2-Methylpropyl acetate
2-Methyl-1-propyl acetate
Acetic acid, 2-methylpropyl ester
Beta-Methylpropyl ethanoate
$C_6H_{12}O_2$ / $CH_3COOCH_2CH(CH_3)_2$
Molecular mass: 116.16

CAS # 110-19-0
RTECS # AI4025000
ICSC # 0494
UN # 1213
EC # 607-026-00-7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Foam, alcohol-resistant foam, powder, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
• INHALATION	Cough. Sore throat.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
• SKIN	Dry skin.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• EYES	Redness.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: an A filter for organic vapours).	Fireproof. Separated from strong oxidants, strong bases, strong acids, and nitrates.	F symbol R: 11 S: (2-)16-23-29-33 Note: C UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0494

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

ISOBUTYL ACETATE

ICSC: 0494

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** Reacts with strong oxidants, strong bases, strong acids and nitrates, causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV (as TWA): 150 ppm; 713 mg/m^3 (ACGIH 1995-1996).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour and and by ingestion. **INHALATION RISK:** A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The vapour slightly irritates the eyes and the respiratory tract. Exposure far above the OEL could cause lowering of consciousness. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin.
PHYSICAL PROPERTIES	Boiling point: 118°C Melting point: -99°C Relative density (water = 1): 0.87 Solubility in water: poor Vapour pressure, kPa at 20°C: 1.73 Relative vapour density (air = 1): 4.0	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.05 Flash point: 18°C c.c. Auto-ignition temperature: 421°C Explosive limits, vol% in air: 1.3-10.5 Octanol/water partition coefficient as log Pow: 1.60
ENVIRONMENTAL DATA		

NOTES

Transport Emergency Card: TEC (R)-507
NFPA Code: H1; F3; R0

ADDITIONAL INFORMATION

ICSC: 0494 ISOBUTYL ACETATE

© IPCS, CEC, 1993

IMPORTANT LEGAL NOTICE: Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **ISOBUTYL ACETATE**

CAS Number: 110-19-0
DOT Number: UN 1213

RTK Substance number: 1041
Date: January 1986 Revision: April 1997

HAZARD SUMMARY

* **Isobutyl Acetate** can affect you when breathed in.
* Exposure to **Isobutyl Acetate** can irritate the eyes, nose and throat.
* **Isobutyl Acetate** can irritate the skin.
  Prolonged and repeated contact can cause drying and cracking of exposed areas.
* High exposures can cause weakness, headache, and drowsiness and may cause you to pass out.
* **Isobutyl Acetate** is a FLAMMABLE LIQUID and a FIRE HAZARD.

IDENTIFICATION

Isobutyl Acetate is a clear, colorless liquid with a pleasant, fruity odor. It is used as a solvent and in perfumes and artificial fruit-flavoring agents.

REASON FOR CITATION

* **Isobutyl Acetate** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NFPA, NIOSH and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **FLAMMABLE** .
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting air samples. Under OSHA 1910.20, you have a legal right to obtain copies of sampling results from you employer.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

* **ODOR THRESHOLD = 1.1 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **150 ppm** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **150 ppm** averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is **150 ppm** averaged over an 8-hour workshift and **187 ppm** as a STEL (short term exposure limit).

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Isobutyl Acetate** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Isobutyl Acetate** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Isobutyl Acetate**:

* Contact can irritate the skin.
* Exposure to **Isobutyl Acetate** can irritate the eyes, nose and throat.
* High exposures can cause weakness, headache, and drowsiness and may cause you to pass out.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Isobutyl Acetate** and can last for months or years:

Cancer Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Isobutyl Acetate** has not been tested for its ability to cause cancer in animals.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Isobutyl Acetate** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* Prolonged and repeated contact can irritate the skin and cause cracking and drying of exposed areas.
* This chemical has not been adequately evaluated to determine whether brain or other nerve damage could occur with repeated exposure. However, many solvents and other petroleum-based chemicals have been shown to cause such damage. Effects may include reduced memory and concentration, personality changes (withdrawal, irritability), fatigue, sleep disturbances, reduced coordination, and/or effects on nerves supplying internal organs (autonomic nerves) and/or nerves to the arms and legs (weakness, "pins and needles").

MEDICAL

Medical Testing

There is no special test for this chemical. However, if illness occurs or overexposure is suspected, medical attention is recommended.

* Evaluate for brain effects such as changes in memory, concentration, sleeping patterns and mood (especially irritability and social withdrawal), as well as headaches and fatigue. Consider evaluations of the cerebellar, autonomic and peripheral nervous systems. Positive and borderline individuals should be referred for neuropsychological testing.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Isobutyl Acetate** from drums or other storage containers to process containers.
* Before entering a confined space where **Isobutyl Acetate** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Isobutyl Acetate** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Isobutyl Acetate**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.

* Do not eat, smoke, or drink where **Isobutyl Acetate** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating or smoking.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Isobutyl Acetate**. Wear solvent-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* ACGIH recommends *Polyvinyl Alcohol* as good to excellent protective material.

Eye Protection

* Wear splash-proof chemical goggles and face shield when working with liquid, unless full facepiece respiratory protection is worn.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposures over **150 ppm**, use a MSHA/NIOSH approved full facepiece dust/fume/mist respirator with an organic vapor cartridge/canister. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter, cartridge or canister respirator, you can smell, taste, or otherwise detect **Isobutyl Acetate**, or in the case of a full facepiece respirator you experience eye irritation, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter, cartridge, or canister. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters, cartridges, or canisters, to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for higher exposures exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
* Exposure to **1,300 ppm** is immediately dangerous to life and health. If the possibility of exposure above **1,300 ppm** exists, use an MSHA/NIOSH approved self contained breathing apparatus with a full facepiece operated in continuous flow or other positive pressure mode.

HANDLING AND STORAGE

* Prior to working with **Isobutyl Acetate** you should be trained on its proper handling and storage.
* **Isobutyl Acetate** must be stored to avoid contact with STRONG OXIDIZERS (such as NITRATES, PERMANGANATES, CHLORINE, CHLORINE DIOXIDE and BROMINE), STRONG ALKALIES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE), and STRONG ACIDS (such as NITRIC and HYDROCHLORIC), since violent reactions occur.
* Store in tightly closed containers in a cool well-ventilated area away from HEAT.
* Sources of ignition such as smoking and open flames are prohibited where **Isobutyl Acetate** is used, handled, or stored in a manner that could create a potential fire or explosion hazard.
* Metal containers involving the transfer of **Isobutyl Acetate** should be grounded and bonded.
* Use only non-sparking tools and equipment, especially when opening and closing containers of **Isobutyl Acetate**.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. Because of this, and because of exposure of children or people who are already ill, community exposures may cause health problems.

The following information is available from:

New Jersey Department of Health and
Senior Services
Occupational Disease and Injury Services
Trenton, NJ 08625-0360
(609) 984-1863

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call a Department of Health and Senior Services physician who can help you find the services you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<

Common Name: **ISOBUTYL ACETATE**
DOT Number: **UN 1213**
NAERG Code: **129**
CAS Number: **110-19-0**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	3
REACTIVITY	-	0
POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* **Isobutyl Acetate** is a FLAMMABLE LIQUID.
* Vapors may travel to a source of ignition and flash back.
* POISONOUS GASES ARE PRODUCED IN FIRE.
* CONTAINERS MAY EXPLODE IN FIRE.
* The vapor is heavier than air and may travel a distance to cause a fire or explosion far from the source.
* Use dry chemical, CO_2, or alcohol foam extinguishers. Water may be used to cool fire-exposed containers.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Isobutyl Acetate** is spilled or leaked, take the following steps:

* Restrict persons not wearing protective equipment from area of spill or leak until clean-up is complete. Vapor build-up may cause suffocation.
* Remove all ignition sources.
* Ventilate area of spill or leak.
* For small quantities, absorb on paper towels. Evaporate in a safe place (such as a fume hood). Allow sufficient time for evaporating vapors to completely clear the hood ductwork. Burn the paper in a suitable location away from combustible materials.
* Keep **Isobutyl Acetate** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Isobutyl Acetate** as a HAZARDOUS WASTE. Contact your Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: (609) 292-7172

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Remove contaminated clothing. Wash contaminated skin with soap and water.

Breathing

* Remove the person from exposure.
* Begin rescue breathing if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.

PHYSICAL DATA

Vapor Pressure: 13 mm Hg at 68°F (20°C)
Flash Point: 64°F (17.7°C)
Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Acetic Acid, 2-Methylpropyl Ester
Other Names:
Acetic Acid, Isobutyl Ester; 2-Methylpropyl Acetate; 3-Methylpropyl Ethanoate

---

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
CN 368, Trenton, NJ 08625-0368
(609) 984-2202

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

iso-Butyl Acetate

MSDS Number: B6186 --- *Effective Date: 06/16/97*

1. Product Identification

Synonyms: Actic Acid 2-Methylpropyl Ester
CAS No.: 110-19-0
Molecular Weight: 116.16
Chemical Formula: CH3COOCH2CH(CH3)2
Product Codes: D668

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Isobutyl Acetate	110-19-0	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED.
TARGET ORGAN(S):Central nervous system.

Potential Health Effects

Inhalation:
Is harmful excessive inhalation may cause narcosis.

Ingestion:
None identified.

Skin Contact:
None identified.

Eye Contact:
May cause irritation.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.

Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use.

Eye Contact:
In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

5. Fire Fighting Measures

Fire:
Flash point: 21C (70F) CC

Explosion:
None identified.

Fire Extinguishing Media:
Water, dry chemical, foam or carbon dioxide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Absorb material in sand or other suitable absorbent and place in container.

7. Handling and Storage

Classified as a flammable liquid. Keep away from heat, sparks and flame. Use with adequate ventilation. Keep container closed. Comply with all federal, state and local codes pertaining to the storage, handling, dispensing and disposal of flammable liquids. Since empty container retains product residue, follow label warnings even after container is empty. Keep from contact with oxidizing materials.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Other Control Measures:
There is insufficient data in the published literature to assign complete numerical SAF-T-DATA* ratings and laboratory protective equipment for this product. Special precautions must be used in storage, use and handling. Protective equipment for laboratory bench use should be chosen using professional judgment based on the size and type of reaction or test to be conducted and the available ventilation, with overriding consideration to minimize contact with the chemical.

9. Physical and Chemical Properties

Appearance:

Colorless liquid.

Odor:
Faint ester odor.

Solubility:
Slight (0.1-1%)

Specific Gravity:
0.87

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
116C (241F)

Melting Point:
No information found.

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
14 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide, carbon monoxide.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizing agents.

Conditions to Avoid:
No information found.

---

11. Toxicological Information

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Isobutyl Acetate (110-19-0)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ISOBUTYL ACETATE
Hazard Class: 3
UN/NA: UN1213
Packing Group: II
Information reported for product/size: 500G

International (Water, I.M.O.)

Proper Shipping Name: ISOBUTYL ACETATE
Hazard Class: 3.2
UN/NA: UN1213
Packing Group: II
Information reported for product/size: 500G

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Isobutyl Acetate (110-19-0)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Isobutyl Acetate (110-19-0)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Isobutyl Acetate (110-19-0)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Isobutyl Acetate (110-19-0)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 3[Y]E
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED.
TARGET ORGAN(S):Central nervous system.

Label Precautions:
No SAF-T-DATA Ratings have been developed for this product. Read and follow all warnings, precautions, instructions and other safety and handling information on the label and MSDS. Keep away from heat, sparks, and flame. Use with adequate ventilation and avoid breathing vapor. Keep container closed. Wash thoroughly after handling.

Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of

the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

OSHA Chemical Sampling Information
Isobutyl Acetate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: Isobutyl Acetate

SYNONYM(s): 2-Methylpropyl acetate; beta-Methylpropyl ethanoate; Acetic acid isobutyl ester

IMIS: 1534

CAS: 110-19-0

NIOSH: RTECS AI4025000; 2452

DOT: UN1213 Flammable Liquid

DESCRIPTION:

Colorless liquid with a pleasant, fruity odor.
MW: 116
BP: 118 C
VP: 13 mm
MP: -99 C

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 150 ppm, 700 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 150 ppm, 700 mg/m3 TWA

THRESHOLD LIMIT VALUE: 150 ppm, 713 mg/m3 TWA

RECOMMENDED EXPOSURE LIMIT: 150 ppm TWA

Health Factors

SYMPTOM(s): Headaches; drowsiness; eye, upper respiratory, and skin irritation; anesthesia

HEALTH EFFECTS: Irritation-Eye, Nose, Throat, Skin---Moderate (HE15) CNS effects (HE7)

ORGAN: Skin, eyes, respiratory system

Monitoring

SLC1:

MEDIA: Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
REF: 1 (NIOSH 1450)
SAE: 0.17
CLASS: Fully Validated

SECONDARY SAMPLING/ANALYTICAL METHOD (SAM2):

DEVICE: Detector Tube **COMPANY:** Sensidyne
PART #: 142 **RANGE:** 0.005-0.66%
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 153SA **RANGE:** 100-14,000 ppm
CLASS: Mfg **DEVICE:** Detector Tube **COMPANY:** Kitagawa
PART #: 153U **RANGE:** 15-400 ppm
CLASS: Mfg **DEVICE:** Instrumentation **COMPANY:** Foxboro
PART #: MIRAN 1A & 1B **RANGE:** 0.1 ppm @ 8.2 um
CLASS: Mfg

OSHA Chemical Sampling Information - Table of Contents

Revision Date: 08/24/1992

NIOSH Pocket Guide to Chemical Hazards

Isobutyl acetate	**CAS** 110-19-0
$CH_3COOCH_2CH(CH_3)_2$	**RTECS** AI4025000
Synonyms & Trade Names Isobutyl ester of acetic acid, 2-Methylpropyl acetate, 2-Methylpropyl ester of acetic acid, beta-Methylpropyl ethanoate	**DOT ID & Guide** 1213 129

Exposure Limits	NIOSH REL: TWA 150 ppm (700 mg/m^3)
	OSHA PEL: TWA 150 ppm (700 mg/m^3)
IDLH 1300 ppm [10%LEL] See: 110190	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity, floral odor.

MW: 116.2	BP: 243°F	FRZ: -145°F	Sol(77°F): 0.6%
VP: 13 mmHg	IP: 9.97 eV		Sp.Gr: 0.87
Fl.P: 64°F	UEL: 10.5%	LEL: 1.3%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1450, Esters I] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1300 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, upper respiratory system; headache, drowsiness, anesthesia; in animals: narcosis
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0494

CHEM SERVICE -- TERT-BUTYL ACETATE, 0-2009
MATERIAL SAFETY DATA SHEET
NSN: 681000N043705
Manufacturer's CAGE: 8Y898
Part No. Indicator: A
Part Number/Trade Name: TERT-BUTYL ACETATE, 0-2009

General Information

Company's Name: CHEM SERVICE INC
Company's P. O. Box: 3108
Company's City: WEST CHESTER
Company's State: PA
Company's Country: US
Company's Zip Code: 19381
Company's Emerg Ph #: 215-692-3026
Company's Info Ph #: 215-692-3026
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 31MAR93
Safety Data Review Date: 04OCT95
MSDS Serial Number: BTGWD
Hazard Characteristic Code: F3

Ingredients/Identity Information

Proprietary: NO
Ingredient: ACETIC ACID, TERT-BUTYL ESTER; (TERT-BUTYL ACETATE) (SARA III)
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: AF7400000
CAS Number: 540-88-5
OSHA PEL: 200 PPM
ACGIH TLV: 200 PPM

Proprietary: NO
Ingredient: SUPP DATA: ADMINISTER LIQUIDS OR INDUCE VOMITING TO AN UNCONSCIOUS OR CONVULSING PERSON. IF PATIENT IS VOMITING- (ING 3)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 2: WATCH CLOSELY TO MAKE SURE AIRWAY DOES NOT BECOME OBSTRUCTED BY VOMIT. GET MEDICAL ATTENTION IF NECESSARY.(ING 4)
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Proprietary: NO
Ingredient: ING 3: REMOVE AND WASH CONTAMINATED CLOTHING.
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: 9999999ZZ
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Physical/Chemical Characteristics

Appearance And Odor: COLORLESS LIQUID, FRUITY/PLEASANT ODOR.
Boiling Point: 208F,98C
Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: 59F,15C

Lower Explosive Limit: 1.5%
Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: VOLATILE VAPORS MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION & FLASH BACK.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): SENSITIVE TO HEAT.
Materials To Avoid: STRONG OXIDIZING AGENTS, NITRATES, STRONG BASES, STRONG ACIDS.
Hazardous Decomp Products: DECOMPOSITION LIBERATES TOXIC FUMES. HAZ COMBUST OR DECOMP PRODS INCLUD: CARBON MONOXIDE AND CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: CONTACT LENSES SHOULD NOT BE WORN IN LAB. ALL CHEMS SHOULD BE CONSIDERED HAZ. AVOID DIRECT PHYSICAL CONTACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY BE HARMFUL IF INHALED. MAY BE HARMFUL IF SWALLOWED. CAN CAUSE EYE IRRIT. CAN CAUSE SKIN IRRITATION. DUST &/OR VAPORS CAN CAUSE IRRIT TO RESP TRACT. (EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT
Signs/Symptoms Of Overexp: HLTH HAZ: CAN BE IRRIT TO MUC MEMBS. CAN CAUSE SENSITIZATION BY SKIN CONTACT. CAN CAUSE AN ALLERGIC SKIN REACTION. REPEATED EXPOSURE TO VAPOR &/OR DUST CAN CAUSE EYE INJURY. CAN CAUSE SEVERE HEADACHE. CAN CAUSE GENERAL FEELING OF DISORIENTATION.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT THE EFT OF A POISON. IT SHOULD BE ADMIN ONLY BY A MD OR TRAINED EMERGENCY PERSONNEL. MED ADVICE CAN BE OBTAINED FROM A POISON CONTROL CTR. EYE: FLUSH CONTINUOUSLY W/WATER FOR AT LEAST 15 MIN. SKIN: FLUSH W/WATER FOR 15-20 MIN. IF NO BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE PATIENT TO FRESH AIR. ADMIN O2 IF (SUPP DATA)

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: VAC AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N).
Precautions-Handling/Storing: THIS CHEM SHLD BE HANDLED ONLY IN A HOOD. EYE SHIELDS SHOULD BE WORN. USE APPROPRIATE NIOSH/MSHA APPROVED SAFETY EQUIPMENT.
Other Precautions: AVOID CONTACT WITH SKIN, EYES & CLOTHING. KEEP TIGHTLY CLOSED IN A COOL DRY PLACE. STORE ONLY WITH COMPATIBLE CHEMICALS. READILY ABSORBED & RETAINED ON CLOTHING AND/OR SHOES.

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.
Protective Gloves: IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APVD CHEMICAL SAFETY GOGGLES (FP N)
Other Protective Equipment: NONE SPECIFIED BY MANUFACTURER.
Work Hygienic Practices: NONE SPECIFIED BY MANUFACTURER.
Suppl. Safety & Health Data: FIRST AID PROC:PATIENT IS HAVING DFCLTY BRTHG. IF PATIENT HAS STOPPED BRTHG ADMIN ARTF RESP. IF PATIENT IS IN CARDIAC ARREST ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSISTANCE HAS ARRIVED. IF PATIENT IS EXHIBITING SIGNS OF SHOCK - KEEP WARM & QUIET. CNTCT POIS CTL CTR IMMED IF NEC. INGEST:DO NOT (ING 2)

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 05OCT93
Label Date: 20SEP93
Label Status: G
Common Name: TERT-BUTYL ACETATE, 0-2009
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-Slight: X
Special Hazard Precautions: EXTREMELY FLAMMABE! DECOMPOSITION LIBERATES MAY BE HARMFUL IF ABSORBED THROUGH SKIN, INHALED, OR INGESTED. MAY BE IRRITATING TO SKIN/EYES. MAY IRRITATE RESPIRATORY TRACT & MUCOUS MEMBRANES. SKIN SENSITIZER. CHRONIC: CAN CAUSE EYE INJURY. CAN CAUSE ALLERGIC SKIN REACTION. CAN CAUSE SEVERE HEADACHE & GENERAL DISORIENTATION.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: CHEM SERVICE INC
Label P.O. Box: 3108
Label City: WEST CHESTER
Label State: PA
Label Zip Code: 19381
Label Country: US
Label Emergency Number: 215-692-3026

OSHA Chemical Sampling Information
tert-Butyl Acetate

OSHA Chemical Sampling Information - Table of Contents

General Description

Field Definitions

NAME: tert-Butyl Acetate

SYNONYM(s): Acetic acid, tert-butyl ester

IMIS: 0442

CAS: 540-88-5

NIOSH: RTECS AF7400000; 1831

DOT: UN1123 Flammable Liquid

DESCRIPTION:

Colorless liquid with a fruity odor.
MW: 116
BP: 208 F

Exposure Limits

OSHA GENERAL INDUSTRY STANDARDS: 200 ppm, 950 mg/m3

OSHA CONSTRUCTION INDUSTRY STANDARDS: 200 ppm, 950 mg/m3 TWA

THRESHOLD LIMIT VALUE: 200 ppm, 950 mg/m3 TWA

RECOMMENDED EXPOSURE LIMIT: 200 ppm TWA

Health Factors

SYMPTOM(s): Itching, inflamed eyes; irritated upper respiratory system; + headaches; narcosis; dermatitis

HEALTH EFFECTS: Irritation-Eye, Nose, Throat---Moderate (HE15); Narcosis (HE8)

ORGAN: Respiratory system, eyes, skin

Monitoring

SLC1:

NIOSH Pocket Guide to Chemical Hazards

tert-Butyl acetate	CAS 540-88-5
$CH_3COOC(CH_3)_3$	RTECS AF7400000
Synonyms & Trade Names tert-Butyl ester of acetic acid	**DOT ID & Guide** 1123 129

Exposure Limits	NIOSH REL: TWA 200 ppm (950 mg/m^3)
	OSHA PEL: TWA 200 ppm (950 mg/m^3)
IDLH 1500 ppm [10%LEL] See: 540885	**Conversion** 1 ppm = 4.75 mg/m^3

Physical Description
Colorless liquid with a fruity odor.

MW: 116.2	BP: 208°F	FRZ: ?	Sol: Insoluble
VP: ?	IP: ?		Sp.Gr: 0.87
Fl.P: 72°F	UEL: ?	LEL: 1.5%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Nitrates; strong oxidizers, alkalis & acids

Measurement Method
Charcoal tube; CS_2; Gas chromatography/Flame ionization detection; IV [#1450, Esters I] See: NMAM INDEX

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: N.R.	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 1500 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions. (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Itch, inflammation eyes; irritation upper respiratory tract; headache; narcosis;

dermatitis
Target Organs respiratory system, eyes, skin, central nervous system
See also: INTRODUCTION