1996 Worldwide Refining Survey

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Survey Editor

All figures in barrels per calendar day

All figures are as of 1-1-97

LEGEND
Numbers identify processes in table

Coking
1. Fluid coking
2. Delayed coking
3. Other

Thermal Processes
1. Thermal cracking
2. Visbreaking

Catalytic Cracking
1. Fluid
2. Other

Catalytic Reforming
1. Semiregenerative
2. Cyclic
3. Continuous regen.
4. Other

Catalytic Hydrocracking
1. Distillate upgrading
2. Residual upgrading
3. Lube oil manufacturing
4. Other
c. Conventional (high-pressure) hydrocracking: (>100 barg or 1,450 psig)
m. Mild to moderate hydrocracking (<100 barg or 1,450 psig)

Catalytic Hydrorefining
1. Residual desulfurization
2. Heavy gas oil desulfurization
3. Catalytic cracker and cycle stock feed pretreatment
4. Mid distillate
5. Other

Catalytic Hydrotreating
1. Pretreating cat reformer feeds
2. Naphtha desulfurizing
3. Naphtha olefin or aromatics saturation
4. Straight-run distillate
5. Pretreating cat cracker feeds
6. Other distillates
7. Lube oil "polishing"
8. Other

Alkylation
1. Sulfuric acid
2. Hydrofluoric acid

Polymerization/Dimerization
1. Polymerization
2. Dimerization

Aromatics
1. BTX
2. Hydrodealkylation
3. Cyclohexane
4. Cumene

Isomerization
1. C4 feed
2. C5 feed
3. C5 and C6 feed

Oxygenates
1. MTBE
2. TAME
3. ETBE

Hydrogen
Production:
1. Steam methane reforming
2. Steam naphtha reforming
3. Partial oxidation

Recovery:
4. Pressure swing adsorption
5. Cryogenic
6. Membrane
7. Other

FOOTNOTES

A Flexicoking.
B Merger of Ampol & Caltex.
C Solvent deasphalting.
D Dewaxing.
E TCC.
F Wax.
G Mid distillate.
H Benzene saturation 6,750 b/cd; LPG merox 4,500 b/cd; kerosene merox 18,000 b/cd.
I Gasoline hydrogenation.
J Houdry.
K JV of Trans Hydrocarbon Ltd. and Kyrgyzneft.
L Previously listed as Kremenchugne.
M Previously listed as Suez Oil Processing Co.
N Distillate aromatics saturation.
O DiME dewaxing 6,300 b/cd.
P Merger of Oberrheinische Mineralolwerke GmbH and Esso AG.
Q High conv. soaker cracking.
R Calciner.
S Unicracking.
T Hydrodewaxing.
U Estimate.
V Previously listed as Kyung In Energy Co. Ltd.
W Previously listed as Kukdong Oil Co. Ltd.
X Isomax.
Y Demex.
Z Previously listed as Petromed.
AA Previously listed as Ertoil SA.
BB Previously listed as OK Raffinaderi AB.
CC JV of LG-Caltex and Government of Thailand.
DD Gulf Oil's share of Pembroke CC Complex.
EE Previously listed as Louisiana Land & Exploration Co.
FF ROSE.
GG Alky. feed.
HH Previously listed as Shell Oil Products Co.
II Olefin saturation.
JJ Leased by Gold Line Refining Ltd.
KK Previously listed as Phibro Refining Inc.
LL Nonregenerative.
MM Joint venture of Citgo and Conoco.
NN Previously listed as Bayway Refining Co.
OO Previously listed as Wynnwood Refining Co.
PP Demex.
QQ Includes assets of Southwestern Refining Co. Inc.
RR HOC.
SS Oleflex 15,500 b/cd.
TT Previously listed as Rafinerija Skopje.

Capacity expressed in barrels per calendar day (b/cd) is the maximum number of barrels of input that can be processed during a 24-hr period, after making allowances for the following:
- Types and grades of inputs to be processed
- Types and grades of products to be manufactured
- Environmental constraints associated with refinery operations.
- Scheduled downtime such as mechanical problems, repairs, and slowdowns.

Capacity expressed in barrels per stream day (b/sd) is the amount a unit can process when running at full capacity under optimal feedstock and product slate conditions. Most U. S. capacity figures have historically been reported in b/sd, but all capacities are reported in b/cd here, as they will be in following years.

Totals

When an asterisk (*) appears beside a refinery location, this indicates that the figure has been converted from b/sd to b/cd by using the conversion factor 0.95 for crude oil and vacuum distillation units, and 0.90 for all downstream cracking and conversion units. Refining processes not covered are noted here.

Process definitions
- Hydrocracking includes processes where 50% of the feed or more is reduced in molecular size.
- Hydrorefining includes processes where 10% of the feed or less is reduced in molecular size.
- Hydrotreating includes processes where essentially no reduction in the molecular size of the feed occurs.
- Hydrogen volumes presented here represent either generation or upgrading to 90+% purity.

Catalytic reforming definitions
- Semiregenerative reforming is characterized by shutdown of the reforming unit at specified intervals, or at the operator's convenience, for in situ catalyst regeneration.
- Cyclic regeneration reforming is characterized by continuous or continual regeneration of catalyst in situ in any one of several reactors that can be isolated from and returned to the reforming operation. This is accomplished without changing feed rate or octane.
- Continuous regeneration reforming is characterized by the continuous regeneration of part of the catalyst in a special regenerator, followed by continuous addition of this regenerated catalyst to the reactor.
- Other includes nonregenerative reforming (catalyst is replaced by fresh catalyst) and moving-bed catalyst systems.

REFINERY SHUTDOWNS

Canada
1. Imperial Oil - Norman Wells, Northwest Territory. 3,600 b/cd capacity, June 1996.

Japan
1. Nippon Petroleum Refining Co., Ltd. - Okinawa. November 1995.

United States
1. Barrett Refining Corp. - Thomas, Oklahoma. 10,500 b/cd capacity, January 1996.
2. Crystal Refining Co., Inc. - Carson City, Michigan. 4,000 b/cd capacity.
3. Cyril Petrochemical Corp. - Cyril, Oklahoma. 5,000 b/cd capacity, August 1995.
4. Intermountain Refining Co., Inc. - Fredonia, Arizona. 5,710 b/cd capacity, January 1996.
5. Tosco Refining Co. - Marcus Hook, Pennsylvania. 180,500 b/cd capacity. Idled in 1996. Mid-1997 restart expected.
6. Total Petroleum Inc. - Arkansas City, Kansas. 56,000 b/cd capacity, September 1996.