

REMEDIES FOR REDUCING FORMALDEHYDE IN SCHOOLS

*Recommendations of the
California Air Resources Board
and Department of Health Services
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When a classroom has been measured with elevated formaldehyde levels (more than 27 parts per billion--ppb), we recommend that the school implement the basic measures listed below. Classrooms with formaldehyde levels below 27 ppb would benefit from these measures as well, because formaldehyde is a carcinogen, and it is desirable to achieve the lowest formaldehyde levels reasonably feasible. However, achieving very low indoor levels (below 5 -10 ppb) generally is not possible. Outdoor levels average about 3 ppb, but can range up to 20 ppb in some areas, such as near traffic.

1. Reduce the total amount of formaldehyde sources in the classroom.

Removing sources is often the most effective way to assure that formaldehyde concentrations are reduced in classroom air. The primary indoor sources are typically pressed wood building materials and furnishings; consumer products and combustion sources can also contribute to indoor levels.

- **Newer, removable sources such as new, freestanding bookshelves and desks made with pressed wood products (e.g., particleboard) should be aired out** in a different, well-ventilated location for as long as conveniently possible, preferably at least two to three weeks. This process will not remove all of the formaldehyde, but it can accelerate the initial off-gassing of formaldehyde, and keep the highest emissions out of the classroom.
- **Avoid using noxious consumer products in the classroom.** Cleaning products, carpet shampoos, surface cleaners, glass cleaners, markers, and cosmetics such as fingernail polish can emit formaldehyde as well as other undesirable chemicals. If some of these products must be used, make sure the ventilation is turned on and run at proper levels.
- **Assure that all combustion appliances are exhausted directly to the outdoors.** Combustion appliances such as gas heaters and ovens produce formaldehyde. They should be checked annually by a professional to assure proper functioning.

2. Provide sufficient ventilation to the classroom.

- **Check the outdoor air flow rate and controls.** An inspection should be conducted to assure that the heating and air conditioning (HVAC) unit is drawing 15 to 20 cubic feet per minute per person of outdoor air into the room. Keep motor vehicles and combustion engines away from the air intakes.

- **To be effective, the HVAC system must be used (turned on).** Verify that the HVAC fan is continuously operating whenever the classroom is being used. If HVAC noise is a problem, consider installing a rubber gasket between the air handler and building shell. Consult with the manufacturer for assistance with noise attenuation.
- **Keep doors and windows open as much as possible.** Additional ventilation can be provided by operating oscillating fans inside the classroom (or in a window) while doors and windows are open. Fleecy materials such as carpet, upholstery, and wall surfaces will adsorb formaldehyde that is in the air and re-emit it as environmental conditions change. Additional ventilation and air circulation will help accelerate the removal of formaldehyde from these surfaces and from the room.
- **Assure that the classroom is maintained at 30% to 50% relative humidity and a comfortable temperature.** Formaldehyde emissions generally increase with higher temperatures and higher humidity.

3. Testing the Air

The following information may be helpful to schools that wish to obtain a follow-up measurement in classrooms after taking steps to reduce formaldehyde levels:

- **Be sure to hire a qualified consultant** or obtain the services of a trained industrial hygienist from the district or a local government agency to conduct the testing. Private consultants may charge about \$1000 - \$1500 to test several classrooms for one day. Advice on hiring an indoor air quality consultant and lists to help locate consultants can be found on-line at <http://www.cal-iaq.org/FIRMS/>.
- **Use an accepted test method.** An active DNPH (dinitrophenylhydrazine) sampler is the preferred method, although other methods may be adequate.
- **Obtain measurements during school hours with the ventilation system in normal operating mode.** This will provide a good estimate of the levels the occupants are actually exposed to in their classrooms. Ideally, a 6-8 hour test is desired, to cover the hours the rooms are occupied.

If Levels Are Still Higher Than Desired

If test results show that formaldehyde concentrations remain elevated after the measures above have been taken, then some additional action may be necessary.

Sealing all exposed surfaces of particleboard furnishings with multiple layers of water resistant sealants--such as polyurethane, vinyl laminate, lacquers, alkyd paints or other water-resistant coatings--can reduce formaldehyde emissions. The effectiveness of these sealants varies greatly by product, thickness of the layer applied, and the thoroughness of application. It is advisable to seal all surfaces, including the back and edges of the board, and use multiple layers of coatings. Sealants themselves may release other chemicals for a period of time, so application and initial off-gassing during

drying must be conducted under high ventilation conditions and/or at an alternate location.

For newer classrooms that show especially high formaldehyde levels even after the measures above have been taken, schools may also want to consider measures such as extensive airing out of the building or sealing of surfaces over the summer.

Future Purchases

When new classrooms or furnishings are ordered or constructed, materials can be specified that emit low or no formaldehyde and other volatile chemicals. Schools may also want to request that any furnishings that might emit chemicals be aired out prior to installation. Airing of carpet for several days at an alternate location, such as at a warehouse, can greatly reduce the chemical levels in the classrooms after installation of the carpet. Specification language for low formaldehyde elements was developed by the Collaborative for High Performance Schools (CHPS) and can be found at the website below.

For More Information

For more information on formaldehyde, visit:

<http://www.arb.ca.gov/toxics/compwood/background.htm>
<http://www.arb.ca.gov/research/indoor/formald.htm> and
<http://www.arb.ca.gov/research/resnotes/notes/97-9.htm>.

For information on designing, constructing, and maintaining healthier school buildings, visit:

CHPS: <http://www.chps.net/>.

Advisory on Relocatable and Renovated Classrooms
<http://www.cal-iaq.org/ADVISORY.pdf>

IAQ Tools for Schools, U.S. Environmental Protection Agency
<http://www.epa.gov/iaq/schools/index.html>