Children's Health Environmental Coalition

HealtheHouse

www.checnet.org/HealtheHouse

Remember, the health effects noted in these profiles assume exposure to the pure form of the substance. The risk you face is affected by how much of the substance you are exposed to, its concentration, its form, the timing of the exposure (when and how long exposure occurs), other substances your child is exposed to, and his or her own individual sensitivity, which in turn can be influenced by age, sex, health status, and genetic make-up.

Chemical Profile

formaldehyde

Rank: Red

Red = **Danger!** Prevent Exposure
Orange = **Warning** - Avoid Exposure
Yellow = **Caution** - Limit Exposure

Common Names: formalin, urea formaldehyde, phenol formaldehyde

Formaldehyde is a strong smelling, volatile organic compound (VOC) and common indoor air pollutant. It is a naturally occurring chemical that is also produced synthetically in large quantities for consumer products, building products such as manufactured woods, and industrial purposes to make plastics and chemicals.

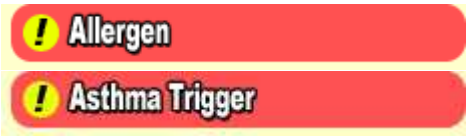
Formaldehyde is a common ingredient in adhesives and finishes. Formaldehyde fumes can enter indoor air from plywood, particleboard, fiberboard, permanent press clothing and draperies, some types of foam insulation, fiberglass, carpets and carpet glues, and some paints and floor finishes. Woods made with urea formaldehyde resins emit higher levels of formaldehyde than those made with phenol formaldehyde.

Formaldehyde is also a component of automobile exhaust. Some fingernail polishes and hardeners contain formaldehyde as well.

Carpets do not contain significant amounts of formaldehyde. However, carpets can trap formaldehyde within its fibers from other sources. This trapped formaldehyde may be released later when humidity and temperature changes occur.

Children may be exposed to formaldehyde fumes in indoor air. Levels may be particularly high in rooms containing a lot of manufactured wood furnishings and plastics, such as mobile homes, trailer homes, and temporary buildings, especially if ventilation is poor.

Acute Toxicity
By Mouth:
Very Highly Toxic
Through Skin:
Highly Toxic
By Inhaling:
Very Highly Toxic



What do these toxicity categories mean?

Significant Statistics:

- Levels of formaldehyde in air as low as 0.1 ppm (0.1 part formaldehyde per million parts of air) can cause watery eyes, burning sensations in the eyes, nose and throat, stuffy nose, nausea, coughing, chest tightness, wheezing, skin rashes, and allergic reactions.

Source: *An Update On Formaldehyde: 1997 Revision (CPSC Document #725).*U.S. Consumer Product Safety Commission, 1997.
http://www.cpsc.gov/cpscpub/pubs/725.html

- Environmental tobacco smoke accounts for 10-25% of formaldehyde exposure.

Source: ATSDR, Toxicological Profile for Formaldehyde, Atlanta GA, 1999.

- Formaldehyde is normally present in air at low levels, usually less than 0.03 parts per million in both outdoor and
indoor air.

Source: *An Update On Formaldehyde: 1997 Revision (CPSC Document #725)*. U.S. Consumer Product Safety Commission, 1997.
http://www.cpsc.gov/cpscpub/pubs/725.html

- Formaldehyde ranks among the top 25 chemicals produced in the U.S., with approximately 11.3 billion pounds manufactured nationwide in 1998.

Source: "Formaldehyde (Gas), CAS No. 50-00-0." *Tenth Report on Carcinogens.* U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, December 2002.
http://ehp.niehs.nih.gov/roc/tenth/profiles/s089form.pdf

Health Effects

- Acute Allergy like reactions, such as watery eyes, burning sensations in the eyes, nose and throat, stuffy nose, skin rashes. Allergic skin rashes and dermatitis may occur from skin contact with permanent-press clothing or other finishes that contain formaldehyde.

- Acute Chronic Flu-like symptoms, headache, fatigue, nausea.

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Inhaling formaldehyde fumes can cause respiratory problems and asthma-like symptoms, such as breathlessness, shortness of breath, wheezing, coughing and/or chest tightness. Repeated exposures may cause bronchitis, with symptoms of cough and shortness of breath.

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Formaldehyde has been linked to a rare form of nasopharyngeal cancer and may also be linked to cancer of the nose and throat in humans. Test animals exposed to formaldehyde fumes have developed nasal cancer. Epidemiological studies show an association between formaldehyde and leukemia but scientists have not been able to show how this might occur. While the U.S. Environmental Protection Agency has ranked formaldehyde a "probable" human carcinogen, the World Health Organization recently upgraded its classification to "known," concluding that formaldehyde "is carcinogenic to humans."

How Exposures Occur

- **Furniture and Flooring**

Pressed Wood Furniture, Flooring, Subflooring, Cabinetry, and other manufactured wood products; Fiberglass: Children can inhale formaldehyde from cabinets, shelves, wood-veneer furniture, laminated flooring, floor underlayments, paneling, and doors made of particleboard, hardwood plywood, and medium density fiberboard (MDF). These pressed woods are bonded with resins containing formaldehyde. Pressed woods made with urea formaldehyde resins emit higher levels of formaldehyde than those made with phenol formaldehyde. Decorative wood laminates may also emit formaldehyde, though at lower levels than pressed woods. Formaldehyde emissions are highest from new pressed woods and will gradually subside over time.

Some fiberglass products, including insulation, may also emit formaldehyde.

- **Some Latex Paints, Floor Finishes and Wallpaper Adhesives**

These products can emit high levels of formaldehyde when wet, although emissions should quickly decline as these coatings dry. Children can inhale formaldehyde during or soon after application, particularly if homes are not adequately ventilated. Some commercially-applied acid-cured floor finishes contain large amounts of formaldehyde and could continue to emit substantial amounts even after drying.

- **Gas Appliances, Fireplaces, Automobile Exhaust**

Children can inhale small amounts of formaldehyde when materials such as wood, kerosene, cigarettes and natural gas are burned inside the home, particularly if gas or kerosene heaters are unvented. Outdoors, children can inhale formaldehyde from vehicle exhaust and smog in outdoor air, but generally at lower amounts than those found indoors. Outdoor formaldehyde levels are typically higher in urban areas.

- **Permanent Press Fabrics, Draperies, Some Coated Paper Products**

Children can inhale formaldehyde from the fabric finish that provides a “permanent press ” quality to new fabrics and draperies, and they can absorb it through their skin from touching treated clothing or bedding for extended periods of time. Emission rates from unwashed new fabrics may rival that of insulation products and are similar to those from paints and finishes. Formaldehyde levels on treated fabrics greatly subside with each washing.

Some papers, including paper bags and paper towels, may be coated with small amounts of finish containing formaldehyde. Generally, emissions from this source is fairly small.

- **Cleaners, Disinfectants, Fabric Softeners**

Some household products may contain formaldehyde as a preservative or fabric finish.

- **Nail Polish and Hardeners, Cosmetics**

Children can inhale formaldehyde if nail polishes or hardeners are being used nearby. These products emit high levels of formaldehyde when wet that drop sharply as the polish dries. However, because they are used to cover a small surface area,exposure is likely to be minor. Teens working in, or children living above, nail salons are more likely to be exposed to significant levels of formaldehyde, however. Formaldehyde is also used as a preservative in some blushes, facial powders, and other cosmetics.

- **Air Fresheners**

Air fresheners sprayed in the house, may contribute to formaldehyde generation, through indoor chemistry reactions, especially in the summer. Rates of formaldehyde production may be quite significant (hundreds of ug/hr) and comparable to those from insulation products.

Solutions

How to detect formaldehyde

- Inspect new wood products. Many furnishings are made with pressed woods. Look at an unfinished or cut end of the wood, or under upholstery. Fiber and particleboard looks like wood chips or sawdust glued together. Plywood is sheets of wood that has been glued and pressed together—at a cut end of the board, you will see layers of wood glued together. Formaldehyde has a distinct, strong odor that is emitted by new or wet formaldehyde products.

- Read labels on building products, cleaners, cosmetics. Look for formaldehyde, urea formaldehyde (UF), or phenol formaldehyde (PF). Note: Pressed woods containing PF resins generally release much lower levels of formaldehyde into the air and are, therefore, preferable to those made with UF resins. You can also request a Material Safety Data Sheet (MSDS) from product manufacturers, which must be provided.

Toll-free numbers for consumers are typically listed on the product label or packaging. You may also find MSDS sheets online at Vermont Safety Information Resources Inc.

http://www.hazard.com

- Watch for unexplainable health effects after purchasing new furnishings or moving into a new or remodeled home. In these and mobile, or trailer, homes, formaldehyde may cause unexplainable headaches, fatigue, watery or burning eyes, stuffy nose, or throat irritation. If these symptoms go away or subside when you are away from home or office but reappear upon your return, they may be caused by formaldehyde or other indoor air pollutants.

- Formaldehyde can cause health effects even when an odor cannot be detected. If odor is detected, it is likely that levels have reached a range that requires action.

How to minimize exposure to formaldehyde

- Ventilate! Open windows and use fans and air conditioning to dilute formaldehyde concentrations with fresh air and to push it outdoors. Ventilation will also reduce moisture and heat buildup. High humidity and heat can cause products to release formaldehyde more readily. In damp regions, dehumidifiers will also help reduce
indoor moisture levels.

Always open windows and use fans when painting indoors. And keep children and pregnant women away from the fumes!

- Seal unfinished pressed wood items with paint, varnish, or water-based polyurethane sealant. Use a finish that does not itself contain formaldehyde and ventilate well while applying.

- Allow new particleboard furnishing and wood to release formaldehyde fumes outdoors or in a well-ventilated, unoccupied space (such as the garage) for a few weeks before bringing into the living space. Be sure to remove all coverings or packaging to allow for maximum release. Increasing heat may speed up the release of fumes.

- Wash new clothing and bedding before use to remove formaldehyde-containing fabric finishes. Try to avoid buying permanent press fabrics. Air out new draperies outdoors, in the garage or in an unoccupied, but well-ventilated, area of your home for a few days.

- Do not smoke or use unvented kerosene heaters indoors. Make sure fireplaces and wood stoves are not leaking exhaust inside the house; keep chimneys and exhaust pipes clean.

- Do not rely on air purifiers to remove formaldehyde from indoor air. Air purifiers are generally not designed to remove gaseous pollutants. Ozone-generating purifiers may contribute to formaldehyde concentrations.

Alternatives

- Choose solid wood, antique or used wood furniture (which has had time to offgas formaldehyde) instead of pressed woods. Solid wood has a grain throughout, which can be seen on all cut edges. See also: What to Look for When Buying *New* Furniture and What to Look for When Buying *Used* Furniture.

- If a pressed wood must be used (in construction, for example), ask retailers for help in choosing lower-emission PF (phenol formaldehyde) woods when possible. Among pressed woods made with urea formaldehyde resins, plywood releases less formaldehyde than particleboard and medium-density fiberboard.

- Ecological alternatives to pressed woods exist. See A Sane Home for more information.

- Choose untreated clothing and bedding, made of natural or organic fibers, when possible. See Pick Your Cotton for more information.

- Formaldehyde-free nail polishes and other cosmetics are available at conventional drugstores and natural foods stores. According to the Environmental Working Group, the following brands of nail polish are among those that do not contain formaldehyde, phthalates or toluene: L'Oréal Paris Jet-Set Quick Dry Nail Enamel®, Revlon Nail Enamel®, Garden Botanika Natural Color Nail Color®, and Kiss Products Kiss Colors®.

For More Information

Books, articles, factsheets and reports

- *An Update On Formaldehyde: 1997 Revision (CPSC Document #725).*U.S. Consumer Product Safety Commission, 1997.
http://www.cpsc.gov/cpscpub/pubs/725.html

- *Public Health Statement for Formaldehyde.*Agency for Toxic Substances and Disease Registry, July 1999.

http://www.atsdr.cdc.gov/toxprofiles/phs111.html

- *The Inside Story: A Guide to Indoor Air Quality.*U.S. Environmental Protection Agency and the U.S. Consumer Product Safety Commission, Office of Radiation and Indoor Air, April 1995.

http://www.epa.gov/iaq/pubs/insidest.html

Recommended technical or scientific materials

- Manuel, John. "Focus: A Healthy Home Environment?" *Environmental Health Perspectives,* Vol. 107, No. 7 (July 1999).
http://ehpnet1.niehs.nih.gov/docs/1999/107-7/focus.html

Other government agencies

U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington DC 20460-0003
Indoor Air Quality Hotline: 800-438-4318
http://www.epa.gov/iaq

U.S. Consumer Product Safety Commission
Washington DC 20207
800-638-2772

http://www.cpsc.gov

California Air Resources Board
Research Division
Indoor Exposure Assessment Section
P.O. Box 2815
Sacramento, CA 95812
916-322-8282

http://www.arb.ca.gov

Nonprofit organizations

American Lung Association
1740 Broadway
New York, NY 10019
212-315-8700

http://www.lungusa.org

The Healthy House Institute
430 N. Sewell Rd.
Bloomington, IN 47408
812-332-5073

http://www.hhinst.com

Other websites

Environmental Defense Chemical Scorecard

http://www.scorecard.org

Sources

- *Indoor Air Quality Guideline: Formaldehyde in the Home.* State of California Air Resources Board, September 1991.
http://www.arb.ca.gov/research/indoor/formald.htm

- *An Update On Formaldehyde: 1997 Revision (CPSC Document #725).* U.S. Consumer Product Safety Commission, 1997.
http://www.cpsc.gov/cpscpub/pubs/725.html

- *Agent Monograph: Formaldehyde.* World Health Organization, International Agency for Research on Cancer, August 13, 1997.
http://www-cie.iarc.fr/htdocs/monographs/vol62/formal.html

- Kelly, Thomas, et al. "Emission Rates of Formaldehyde from Materials and Consumer Products Found in California Homes." *Environmental Science and Technology,* January 1, 1999.

- "Formaldehyde (Gas), CAS No. 50-00-0: Reasonably Anticipated to be a Human Carcinogen." *Tenth Report on Carcinogens.* U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, December 2002.

http://ehp.niehs.nih.gov/roc/tenth/profiles/s089form.pdf

- Fagin, Dan, Marianne Lavelle, and the Center for Public Integrity. *Toxic Deception: How the Chemical Industry Manipulates Science, Bends the Law, and Endangers Your Health.* Secaucus, New Jersey: Birch Lane Press, 1996.

- *Public Health Statement for Formaldehyde.* Agency for Toxic Substances and Disease Registry, July 1999.
http://www.atsdr.cdc.gov/toxprofiles/phs111.html

- *Formaldehyde Chemical Backgrounder.* National Safety Council. http://www.nsc.org/library/chemical/Formalde.htm

- Grazuleviciene R, Dulskiene V, Vencloviene J, 1998, Formaldehyde exposure and low birth weight incidence. J Occup Health 40:61-67

- Reiss R, Ryan PB, Tibbets SJ et al., 1995, Measurement of organic acids, aldehydes and ketones in residentia environments and their relation to ozone, J Air Waste Management Ass., 45:811-822

- Zhang, Junfeng and Lioy, Paul J. 1994. Ozone in Residential Air: Concentrations, I/O Ratios, Indoor Chemistry, and Exposures. Indoor Air. Journal of the International Society of Indoor Air Quality and Climate. 4:95-102.

- "IARC Classifies Formaldehyde as Carcinogenic to Humans," International Agency for Research on Cancer, Press Release No. 153, June 15, 2004. tp://www.iarc.fr/pageroot/PRELEASES/pr153a.html

Other

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