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The Invisible Environment Fact Sheet Series

Formaldehyde

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Formaldehyde, also known as formalin, embalming fluid, or formol, is a colorless gas with a pungent odor. The EPA classifies it as a probable human carcinogen. This fact sheet discusses formaldehyde, its uses, health threats from exposure, and ways you can minimize your exposure to the chemical.

Use of Formaldehyde

The chemical formaldehyde (HCHO) is a preservative and a disinfectant. The family of formaldehyde chemicals is used in pressed wood products, urea-formaldehyde (UF) foam insulation, embalming fluids, carpets, combustion appliances, clothing, and tobacco. Of all home products containing formaldehyde, pressed wood has the highest concentrations. Paneling, particleboard, hardwood plywood, and particularly medium-density fiberboard are all glued with UF adhesives.

In the 1970s, the predominant use of formaldehyde in the home was in urea-formaldehyde foam insulation (UFFI). This type of insulation begins to deteriorate after exposure to high humidity and high temperatures, and in many homes the levels of formaldehyde were high. As a result, in February 1982, UFFI was banned by law. In 1983, the law was overturned, but the marketability of UFFI already had been destroyed.

The use of formaldehyde in other products is at a fairly low level. In fabrics, formaldehyde is used to bind pigments, as a fire retardant, and to create stiffness. In cottons and cotton blends, formaldehyde adds wrinkle resistance and water-repelling qualities. Due to its water resistance, formaldehyde is used in the manufacture of grocery bags,

paper cups and plates, waxed paper, facial tissues, napkins, paper towels, and sanitary napkins. Formaldehyde is also used in cosmetics and fabric softeners. Emissions from unvented gas stoves, wood or kerosene space heaters, and cigarettes also contain low levels of formaldehyde. Although burning products with formaldehyde does release very low levels of the gas, the amount of formaldehyde in these products is minimal and is usually not a concern.

Formaldehyde enters the environment through gradual release from the parent material. This passive release is called offgassing or outgassing. Because outgassing is gradual, the level of formaldehyde emitted from most manufactured products decreases over time. With pressed wood, the outgassing occurs rapidly, immediately after manufacture. Outgassing occurs more slowly during subsequent months or years as the glue breaks down. Newer products manufactured with formaldehyde have reduced levels of outgassing overall.

Health Effects

Formaldehyde is measured in parts per million (ppm) in the air. In adults, symptoms of exposure to formaldehyde may be seen at concentrations as little as 0.1 ppm. Infants, the elderly, those with specific allergic reactions, and persons with respiratory problems may react to lower levels of the gas. Individual reactions to different levels of formaldehyde (as with most environmental stimuli) vary greatly based on hereditary and lifestyle factors. Symptoms of formaldehyde exposure include burning sensation in the eyes and throat, nausea, vomiting, and difficulty breathing. When the reaction is allergic, symptoms may

include dermatitis, respiratory irritation, and watery eyes. Exposure to concentrations greater than 1000 ppm is extremely dangerous. Studies have shown that extreme cases of exposure or chronic exposure can cause cancer; however, the typical exposure is believed to be too low to cause cancer.

Symptoms of exposure are both immediate and severe. Unless the dosage is very large, the prognosis for recovery is very good. Even those who react severely recover. For less severe exposures, removing oneself from the area and a short amount of time can often suffice for treatment. Allergic reaction may also occur due to skin contact with clothing treated with formaldehyde. In such cases, limiting or eliminating exposure to such fabrics will help relieve symptoms.

Formaldehyde is generally present in low levels both indoors and outdoors. The average formaldehyde level in remote outdoor locations is 0.002 to 0.006 ppm; in industrialized areas, the average levels are between 0.01 and 0.05 ppm. In older conventional homes, formaldehyde readings average less than 0.05 ppm. In mobile homes, homes with a great deal of pressed wood, or homes with UFFI insulation, the range of formaldehyde may vary and has been identified at levels of 0.02 to 4 ppm.

Things to Do in the Home or Office

Many other indoor gases cause symptoms similar to formaldehyde. If you suspect formaldehyde may be present at a threatening level in one of your environments, first have the air tested. Check the yellow pages for laboratories that would take such measurements. Some realtors also have contacts with firms that conduct formaldehyde testing in the home.

A major step for mitigating any indoor air pollutant is to ensure proper ventilation within the home; a tightly sealed structure allows contaminants to accumulate. When possible, open windows and allow air to move through the structure. With carpets, clothing, and other small emitters, proper ventilation will control formaldehyde levels. Washing wrinkle-free clothing before use can also help reduce exposure.

When the outgassing is from a specific source, control that source. With UFFI, for example, seal the containing walls. Use caulk or spackle to fill any holes and cracks. Check light switches and outlets for possible cracks as well. Good paint or vinyl wall coverings (such as wallpaper) can seal walls and reduce outgassing.

Additional Reading

U.S. Consumer Product Safety Commission. An Update on Formaldehyde. (1997).
<http://www.cpsc.gov/cpsc/pub/pubs/725.pdf>

U.S. EPA. An Introduction to Indoor Air Quality.
<http://www.epa.gov/iaq/formalde.html>

American Lung Association. Indoor Air Pollutants.
<http://www.lungusa.org/site/apps/s/search.asp?c=dvLUK9O0E&b=34706>

National Cancer Institute. Formaldehyde and Cancer.
<http://www.cancer.gov/cancertopics/factsheet/Risk/formaldehyde>

OSHA Factsheet. (2002). Formaldehyde.
http://www.osha.gov/OshDoc/data_General_Facts/formaldehyde-factsheet.pdf

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