

FACT SHEET

March, 2003

Formaldehyde

At low levels of exposure, formaldehyde can cause respiratory irritation and sensitization, and at high levels, fluid build-up in the lungs and death. Studies of workers exposed to formaldehyde demonstrated an association between formaldehyde and cancer and effects on the reproductive system. Formaldehyde is used in tissue preservation processes (pathology laboratories), building products (plywood, particle board), cosmetics, certain insulation materials, and as an intermediate in the manufacturing of industrial chemicals used in particleboard, surface coatings, and explosives.

Health Effects

Formaldehyde is a probable human carcinogen and several studies indicate an increased incidence of lung and nasopharyngeal cancer in individuals occupationally exposed. Links have been made between formaldehyde exposure and reproductive effects (menstrual disorders, pregnancy problems) in animal and human studies. People exposed to formaldehyde can experience eye, nose, throat and respiratory tract irritations, asthma attacks, headache, chest pains, wheezing, bronchitis, skin irritations and allergic skin reactions, including contact dermatitis. At higher levels of exposure, formaldehyde may induce death by causing fluid build-up in the lungs (pulmonary edema). Formaldehyde also has been shown to impair DNA in laboratory experiments and has been associated with nasal tumor development in rats.

Common Uses

Formaldehyde is used as an intermediate in the production of chemical products for particleboard, explosives, surface coatings, in paper-coating and laminating, cosmetics, and leather tanning processes. It is an adhesive in particleboard and plywood and is used in some disinfectants. More than 5.6 million pounds of formaldehyde were used by Massachusetts manufacturers in 1998. The Occupational Safety and Health Administration (OSHA) estimates that approximately 2.1 million workers are occupationally exposed to formaldehyde annually. Formalin (a mixture of 37% formaldehyde and water) is used in tissue preservation processes (pathology laboratories and embalming), but there is no way to accurately determine how much formalin, and therefore formaldehyde, is used in these processes. Certain work settings (particleboard mills and clinical laboratories) are of particular concern due to workers' frequent exposure to formaldehyde, which is flammable, and formaldehyde-containing products. There is also concern that children may be exposed in schools if particleboard with formaldehyde is used. There is no easy way for a consumer to know how much formaldehyde a product—such as particleboard—contains.



Formaldehyde also is produced as a byproduct during combustion, including in tobacco smoke, automobiles, power plants, incinerators, and refineries.

Alternatives

Because of its chemical properties, alternatives for formaldehyde as an intermediate in chemical production are not widely available, although some possible alternatives, such as horseradish peroxidase process and the use of pyrolysis (rapid heating in the absence of oxygen) of agricultural and forestry wastes, have been researched. The soy peroxidase enzyme also has been found to be useful in the manufacturing of a variety of phenolic resins, while reducing processing time with substantially increased yield. Alternatives for formaldehyde used in janitorial cleaning products, such as disinfectants, exist, as do alternatives for tissue preservation. They include microwave technologies and products such as Glyo-fixx, a commercially available mixture of 20% ethanol, 5% glyoxal, 1% propanol, and 1% methanol. Solid wood and building materials made of straw, metal, stone, and brick are not treated with formaldehyde and can be viable substitutes, although research is needed to develop safer substitutes for formaldehyde in particleboard and building materials. Technologies that reduce off-gassing from particleboard produced with formaldehyde also exist. Formaldehyde used in school science laboratories can be eliminated by purchasing alternative preservatives through scientific supply vendors.

Due to concerns over its toxicity, the state of Massachusetts banned the future use of urea formaldehyde foam insulation (UFFI) in 1979. The state also requires real estate agents and home sellers to honestly disclose information about the presence of UFFI when selling a home insulated with it. The state also maintains a list of program-certified UFFI removal contractors.

References

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Additional Resources

- Agency for Toxic Substances and Disease Registry (ATSDR): <http://www.atsdr.cdc.gov/toxpro2.html>
- Scorecard: <http://www.scorecard.org>
- Lowell Center for Sustainable Production—Sustainable Hospitals Project: <http://www.sustainablehospitals.org>
- Massachusetts Toxics Use Reduction Institute (TURI): <http://www.turi.org>