

tics, and dyes. Its odor is not pronounced enough to serve as a warning. Its health hazard for acute and repeated exposures is high. In one case, death was reported after several days' inhalation of an average concentration of 470 ppm. Death was accompanied by central nervous system damage, bronchopneumonia, and severe liver and kidney injury. Liquid dioxane may be absorbed through the skin to produce injury.

Diphenyl. No cases of acute or chronic intoxication attributed solely to diphenyl have been reported for man in the published literature. Inhalation is not a serious hazard in industry due in part to the low vapor pressure at room temperature and the relatively good warning properties of this material. Although animal data indicates that diphenyl has little irritating potential, it does indicate that diphenyl can be absorbed through the intact skin. Contact with the skin should, therefore, be avoided to eliminate the possibility of systemic injury. Because moderate air concentrations of this material are irritating, voluntary exposure is limited to levels that are presumably not hazardous.

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Epichlorohydrin is a primary raw material in the production of epoxy and other resins. Its vapor is highly irritating to the eyes and respiratory tract. Pulmonary edema and kidney damage may occur. Animal experiments with 500 ppm for 4 hr, and 62 ppm for 7 hr per day for 45 days, both produced deaths in the test groups. Inhalations of 16 ppm for 7 hr per day for 90 days produced some bronchial irritation in dogs and monkeys. Epichlorohydrin was also shown to be highly toxic when ingested or applied for 24 hr to the skin of rats and rabbits.

In man, liquid epichlorohydrin produces a transient burning sensation on first skin contact, which may lead to blistering and deep-seated pain within several hours. The liquid is also highly irritating to the eyes. Some cases of sensitization to small quantities of epichlorohydrin have been reported.

Epoxy resins are condensation products of epichlorohydrin and bisphenol-A or other polyhydric compounds. The resin and a

hardening or curing agent (amines, peroxides, organic acid anhydrides, amine adducts, boron trifluoride amines, amides, and polyamides) are usually mixed at the time of use. The chief health hazard is the ability of the amine hardeners to cause dermatitis.

Although the curing agents exhibit some degree of toxicity, greater effort is required to prevent local irritation or sensitization during handling than would ordinarily be required to prevent systemic intoxication by the most toxic of them. Cured epoxy resins are considered to be relatively nontoxic.

Ethanol (ethyl alcohol) is an extremely versatile and widely used solvent. When absorbed into the body, it is rapidly metabolized so that heavy exposure is required to build up a substantial concentration in the tissues. Exposure to a high concentration of the vapor will produce irritation of the mucous membranes, headache, nervousness, dizziness, tremors, fatigue, nausea, and loss of consciousness. If the exposure is excessive and repeated, it may produce damage to the liver. Those not accustomed to alcohol will be uncomfortable after prolonged exposure to slightly over 1000 ppm.

Ethyl acetate is a volatile, flammable solvent of low toxicity. Animals exposed to 2000 ppm for long periods show either no discomfort or irritation of the eyes and dryness of the mouth as the only detectable effects.

Ethyl acrylate. Very little information on human experience with ethyl acrylate has been published. Animal experiments have shown it to be moderately toxic and highly irritating by several routes—the respiratory tract is the prime route of absorption, although the skin also presents a route by which physiologically significant amounts of the compound may enter the body.

The odor of ethyl acrylate vapor, readily detectable at 1 ppm, is fairly strong and moderately irritating at 4 ppm. It is believed that most humans will not work at the recommended maximal concentration of 25 ppm for any appreciable length of time. General ventilation should be used to control or reduce ethyl acrylate vapor concentrations to acceptable levels. A self-contained breathing