ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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Ethylbenzene: Health Information Summary

Ethylbenzene is a clear, flammable liquid with a gasoline-like odor. It is naturally present in petroleum. Ethylbenzene is used mainly for the production of styrene. It is also used in the manufacture of dyes, rubber adhesives, paints and varnishes, as a constituent in asphalt and naptha, and is added to gasoline up to 2 percent by weight. Ethylbenzene is commonly found in the air because it is a constituent of automobile exhaust. Levels measured in air in urban areas are often about five times higher than what is found in rural areas. Ethylbenzene does not persist in the air, with 50 percent degrading in one to two days. The odor threshold for ethylbenzene in water is reported to be between 0.3 and 0.14 parts per million (ppm); the reported odor threshold in air is 2.3 ppm.

Health Effects

Absorption/Metabolism

In human and animal studies, ethylbenzene absorption by inhalation ranged from about 40 to 60 percent. In animal studies, absorption following ingestion was in the 70 to 90 percent range. One animal study found dermal absorption of ethylbenzene in mice to be about 3 percent. Ethylbenzene is not stored in the body; most of it is eliminated within two days after exposure.

Short Term (Acute) Effects

Human volunteers exposed by inhalation to high concentrations of ethylbenzene experienced effects that included sleepiness, fatigue, headache, eye, nasal and throat irritation, chest constriction, tearing of the eyes, and difficulty breathing.

Neurological effects have been seen in animal studies following acute exposure to high levels of ethylbenzene. These effects included impaired muscle coordination, salivation, and reduced activity. Inhalation exposure to high ethylbenzene concentrations affected hearing in animals.

Increases of platelets and white cells in blood were observed in rats, but not in two other animal species exposed to ethylbenzene for one month by inhalation.

Long-Term (Chronic) Effects

Two hundred ethylbenzene production workers were monitored for a 20-year period for effects on the blood and liver. No adverse health effects were noted when compared to a non-exposed population.

Results of animal studies in several species have shown changes to the liver and kidney from inhalation exposure to ethylbenzene including biochemical alterations, tissue changes, and increased organ weights. In animals exposed orally to ethylbenzene; toxic changes to the liver and kidney were found. Orally exposed animals had inner ear damage, which confirms short-term study results.

In a two year inhalation study, rats exposed to ethylbenzene at the highest dose had an increase incidence of abnormal tissue growth in the kidney.

Reproductive/Developmental Effects

In a lifetime inhalation exposure study, an increase in non-cancerous testicular tumors was seen in rats exposed to ethylbenzene at the highest dose. The developmental malformation of extra ribs and low birth weight was seen in two inhalation studies in which rat fetuses received ethylbenzene via exposure to the mother.

Carcinogenicity (Ability to Cause Cancer)

There is sparse information available to make a decision whether ethylbenzene exposure can cause cancer in humans. There is one occupational study that investigated workers exposed to ethylbenzene by inhalation. Although there is no evidence of increased cancer incidence after twenty years of monitoring, this time frame is too short to detect some tumor types that can take a longer time to develop.

A lifetime animal study with ethylbenzene exposure by inhalation reported increased incidences of kidney, liver, and testicular tumors in animals. The relevance of the animal study results to humans has not yet been determined. Ethylbenzene was categorized by the Environmental Protection Agency (EPA) as a Group D carcinogen (inadequate evidence to classify).

Health Standards and Criteria

The EPA has established a Maximum Contaminant Level Goal (MCLG) for ethylbenzene in public drinking water systems. MCLGs are non-enforceable health standards for drinking water. MCLGs are set at a level at which no adverse health effects would be expected to result from the consumption of two liters (0.53 gallons) of contaminated water per day by a 70 kg (154 lb) adult. The MCLG for ethylbenzene is 700 ppb (ppb = micrograms per liter or ug/l).

The EPA has also established a Maximum Contaminant Level (MCL) for ethylbenzene in public drinking water systems. MCLs are enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and cost of treating contaminated water. The MCL for ethylbenzene is also 700 ppb.

The Occupational Safety and Health (OSHA) enforceable standard (permissible exposure limit or PEL) for ethylbenzene in workplace air is 100 ppm averaged over eight hours.

For more information, please contact the DES Environmental Health Program, 29 Hazen Drive, Concord, NH 03302-0095; (603) 271-1370.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Seventh Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 2008.

Toxicological information on ethylbenzene. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision 8/91.

Toxicological Profile for Ethylbenzene (Update). Agency for Toxic Substances and Disease Registry (ATSDR). Atlanta, GA. November, 2010.