



1,4-Dioxane

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1,4-Dioxane is a clear liquid with a faint pleasant odor. It mixes easily with water [ATSDR].

1,4-Dioxane can be released into the air, water, and soil at places where it is produced or used as a solvent. In water, 1,4-Dioxane is stable and does not break down [ATSDR].

Usage and exposure

1,4-Dioxane is used in many industries. It is used as an industrial solvent, a laboratory reagent, and in the manufacture of other chemicals [CDC].

Exposure to 1,4-dioxane may occur during its manufacture and its use as a solvent in a wide range of organic products. It has been detected in ambient air. 1,4-Dioxane is used as a solvent in a wide range of organic products: lacquers; paints; varnishes; paint and varnish removers; wetting and dispersing agent in textile products, dye baths, and stain and printing compositions; cleaning and detergent preparations; cements; cosmetics; deodorants; fumigants; emulsions; and polishing compositions. It is also used as a stabilizer for chlorinated solvents [IARC].

Routs of exposure

Respiratory system

1,4-Dioxane is rapidly absorbed upon inhalation or after oral administration, it does not accumulate in the body, its penetration of skin is poor [IARC].

Metabolism

1,4-Dioxane is rapidly absorbed and metabolized and does not accumulate in the body, but the saturation of metabolism at high doses is of toxicological

relevance. The major metabolite is β -hydroxyethoxyacetic acid, which is rapidly excreted. [IARC].

Target organs

Eyes, skin, respiratory system, liver, kidneys.

Health hazards

1,4-Dioxane causes irritation of eyes, skin, nose, throat, headache, nausea, vomiting [CDC].

Short term exposure: Eye and nose irritation was reported by people exposed to low levels of 1,4-dioxane for short periods of time. Exposure to very high levels may cause severe kidney and liver effects and possibly death [ATSDR].

Long term exposure: Studies in animals have shown that breathing vapors of 1,4-dioxane affects mainly the nasal cavity and the liver and kidneys. Swallowing liquid 1,4-dioxane or contaminated drinking water, or having skin contact with liquid 1,4-dioxane also affects the liver and kidneys [ATSDR].

IARC Evaluation

There is inadequate evidence in humans for the carcinogenicity of 1,4-dioxane.

There is sufficient evidence in experimental animals for the carcinogenicity of 1,4-dioxane (positive results were obtained in a cell transformation assay and conflicting results were obtained in mouse bone-marrow cell tests for micronucleus induction).

1,4-Dioxane is possibly carcinogenic to humans (Group 2B).

References

- ATSDR, Agency for Toxic Substances & Disease Registry. Public Health Statement for 1,4 Dioxane.
<https://www.atsdr.cdc.gov/phs/phs.asp?id=953&tid=199>
- CDC, Centers for Disease Control and Prevention. NIOSH Pocket Guide to Chemical Hazards. 1,4-Dioxane.
<https://www.cdc.gov/niosh/topics/1-4-dioxane/default.html>

- IARC, International Agency for Research on Cancer. IARC Monographs, Vol. 71. Re-evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide. 1999 pp:589-602.