

This fact sheet answers the most frequently asked health questions (FAQs) about 1,4-dioxane. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,4-dioxane occurs from breathing contaminated air, ingestion of contaminated food and drinking water, and dermal contact with products such as cosmetics that may contain small amounts of 1,4-dioxane. Exposure to high levels of 1,4-dioxane in the air can result in nasal cavity, liver, and kidney damage. Ingestion or dermal contact with high levels of 1,4-dioxane can result in liver and kidney damage. 1,4-Dioxane has been found in at least 31 of 1,689 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is 1,4-dioxane?

1,4-Dioxane is a clear liquid that easily dissolves in water. It is used primarily as a solvent in the manufacture of chemicals and as a laboratory reagent. 1,4-Dioxane is a trace contaminant of some chemicals used in cosmetics, detergents, and shampoos. However, manufacturers now reduce 1,4-dioxane from these chemicals to low levels before these chemicals are made into products used in the home.

What happens to 1,4-dioxane when it enters the environment?

- 1,4-Dioxane can be released into the air, water, and soil at places where it is produced or used as a solvent.
- In air, 1,4-dioxane rapidly breaks down into different compounds.
- In water, 1,4-dioxane is stable and does not break down.
- In soil, 1,4-dioxane does not stick to soil particles, so it can move from soil into groundwater.
- Fish and plants will not accumulate 1,4-dioxane in their tissues.

How might I be exposed to 1,4-dioxane?

- Breathing air, drinking water, or eating foods that contain 1,4-dioxane. During showering, bathing, or laundering, 1,4-dioxane in tap water may volatilize and you can be exposed to 1,4-dioxane vapors.

- Your skin may contact 1,4-dioxane when you use cosmetics, detergents, bubble baths, and shampoos containing 1,4-dioxane.

How can 1,4-dioxane affect my health?

Few studies are available that provide information about the effects of 1,4-dioxane in humans. Exposure to very high levels of 1,4-dioxane can result in liver and kidney damage and death. Eye and nose irritation was reported by people inhaling low levels of 1,4-dioxane vapors for short periods (minutes to hours).

Studies in animals have shown that breathing vapors of 1,4-dioxane affects mainly the nasal cavity, liver, and kidneys. Ingesting 1,4-dioxane or having skin contact with 1,4-dioxane also affects the liver and kidneys.

How likely is 1,4-dioxane to cause cancer?

The limited number of studies available does not show whether 1,4-dioxane causes cancer in humans. Laboratory rats that breathed vapors of 1,4-dioxane during most of their lives developed cancer inside the nose and abdominal cavity. Laboratory rats and mice that drank water containing 1,4-dioxane during most of their lives developed liver cancer; the rats also developed cancer inside the nose. Scientists are debating the degree to which the findings in rats and mice apply to exposure situations commonly encountered by people.

The (DHHS) U.S. Department of Health and Human Services considers 1,4-dioxane as reasonably anticipated to be a human carcinogen.

1,4-Dioxane

CAS # 123-91-1

How can 1,4-dioxane affect children?

There are no studies of children exposed to 1,4-dioxane. However, children might experience health problems similar to those in adults if they were exposed to high concentrations of 1,4-dioxane.

Scientists do not know whether exposure of pregnant women to 1,4-dioxane can harm the unborn child.

How can families reduce the risk of exposure to 1,4-dioxane?

1,4-Dioxane may be a contaminant in cosmetics, detergents, bath products, shampoos, and some pharmaceuticals. 1,4-Dioxane is not intentionally added, but may occur as an unintentional byproduct in some ingredients that may be listed on the product label, including: PEG, polyethylene, polyethylene glycol, polyethoxyethylene,-eth or -oxynol . Many products on the market today (foods, pharmaceuticals, cosmetic products, detergents, etc.) contain 1,4-dioxane in very small amounts. However, some cosmetics, detergents, and shampoos may contain 1,4-dioxane at levels higher than recommended by the FDA for other products. Families wishing to avoid cosmetics containing the ingredients listed above may do so by reviewing the ingredient statement that is required to appear on the outer container label of cosmetics offered for retail sale.

1,4-Dioxane has been detected in some drinking water supplies. Bottled water may be less likely to be contaminated with 1,4-dioxane, and consumers should contact the bottler with specific questions on potential contaminants.

Is there a medical test to determine whether I've been exposed to 1,4-dioxane?

1,4-Dioxane and its breakdown products can be measured in your blood and urine, and positive results indicate you have been exposed to 1,4-dioxane. These tests do not predict whether exposure to 1,4-dioxane will produce harmful health effects. The tests are not routinely available at your doctor's office because they require special equipment, but the doctor can collect the samples and send them to a special laboratory. The tests need to be conducted within days after the exposure because 1,4-dioxane and its breakdown products leave the body fairly rapidly.

Has the federal government made recommendations to protect human health?

EPA has determined that exposure to 1,4-dioxane in drinking water at concentrations of 4 milligrams per liter (4 mg/L) for one day or 0.4 mg/L for 10 days is not expected to cause any adverse effects in children.

The Occupational Safety and Health Administration (OSHA) has set a limit for of 100 parts 1,4-dioxane per 1 million parts of air (100 ppm) in the workplace.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2012. Toxicological Profile for 1,4-Dioxane. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.