

1. PUBLIC HEALTH STATEMENT FOR GLUTARALDEHYDE

This Public Health Statement summarizes the Agency for Toxic Substances and Disease Registry's (ATSDR) findings on glutaraldehyde, including chemical characteristics, exposure risks, possible health effects from exposure, and ways to limit exposure.

If you are exposed to glutaraldehyde, many factors determine whether you'll be harmed. These include how much you are exposed to (dose), how long you are exposed (duration), how often you are exposed (frequency), and how you are exposed (route of exposure). You must also consider the other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

WHAT IS GLUTARALDEHYDE?

Glutaraldehyde is a colorless, oily liquid with a sharp, pungent odor. Other names for glutaraldehyde include pentanedial, glutaral, and 1,5-pentanedial, as well as a variety of other chemical and trade names. Glutaraldehyde is not stable in its pure form, so it is usually found in a solution mixed with water.

Glutaraldehyde is used for industrial, laboratory, agricultural, and medical purposes, primarily for disinfecting and sterilization of surfaces and equipment. It may be found in medical facilities where it is used to disinfect equipment that cannot be subject to heat sterilization. It is also used in industrial cleaning supplies. The majority of the uses of glutaraldehyde are industrial as opposed to consumer applications. For example, it is used in oil and gas recovery, waste water treatment, as a pesticide and in fogging and cleaning of poultry houses, as a chemical intermediate in the production of various materials, in the paper industry, in x-ray processing, in embalming fluid, and for leather tanning. It may be used in select goods, such as paint and laundry detergent. Detailed information about the uses of glutaraldehyde can be found in Chapter 5.

WHAT HAPPENS TO GLUTARALDEHYDE WHEN IT ENTERS THE ENVIRONMENT?

Glutaraldehyde can get into air from its use as a disinfectant, such as in hospitals and dental clinics, and from other commodities that may use glutaraldehyde (e.g., paints). Industries using glutaraldehyde can also cause its release to air (e.g., oil and gas industry, animal facilities, and water treatment facilities). Glutaraldehyde in air will be degraded by light within a relatively short time period; that is, half will be gone from air in 16 hours.

1. PUBLIC HEALTH STATEMENT

Use of glutaraldehyde as a disinfectant can cause it to enter water, such as from hospital wastewater. Glutaraldehyde may enter groundwater during its use as a biocide for processes such as industrial water treatment or oil and gas recovery and pipeline operations. In water, glutaraldehyde will degrade quickly. Depending on how much oxygen is available in the water, glutaraldehyde might turn into carbon dioxide or 1,5-pentanediol.

Glutaraldehyde can get into soil in similar ways as it can get in to water. Contaminated water can seep into nearby soils. Glutaraldehyde will most likely disappear quickly from soil due to degradation. It is expected to travel quickly through soil.

HOW MIGHT I BE EXPOSED TO GLUTARALDEHYDE?

You are most likely to be exposed if you use products such as disinfectants that contain glutaraldehyde or if you are around areas that are being disinfected with glutaraldehyde-containing products. Because glutaraldehyde is used in oil and gas recovery operations (including hydrofracturing processes), there is potential for exposure among workers and the general population in areas surrounding such operations.

HOW CAN GLUTARALDEHYDE ENTER AND LEAVE MY BODY?

Most of the glutaraldehyde that you breathe in will react with tissue in your nose (or mouth and throat if you breathe it in through your mouth) and cause irritation; some may enter your blood.

You are not likely to come into contact with glutaraldehyde in drinking water. If you do, some of it would react with tissue in your gastrointestinal tract and cause irritation. Some might enter your blood.

You are not likely to come into contact with glutaraldehyde in soil. If you were to get glutaraldehyde on your skin, a very small amount might enter your blood.

Glutaraldehyde in the blood can travel throughout the body; it appears to rapidly break down into other substances including carbon dioxide.

Animal studies indicate that much of the glutaraldehyde that enters your blood is converted into carbon dioxide and leaves your body when you breathe it out. Some of the glutaraldehyde and/or its breakdown

1. PUBLIC HEALTH STATEMENT

products leave your body in the urine. If you were to drink water or eat food containing glutaraldehyde, more of it and/or its breakdown products would leave your body in the feces than in urine or exhaled air.

HOW CAN GLUTARALDEHYDE AFFECT MY HEALTH?

You are not likely to be exposed to amounts of glutaraldehyde that would harm you. If you were, the health effects would depend on the amount of glutaraldehyde to which you were exposed.

Your skin and eyes could become irritated if glutaraldehyde were to contact your skin and eyes. Your nose could become irritated if you were to breathe in glutaraldehyde. Your mouth, esophagus, and stomach could become irritated if glutaraldehyde were to enter your mouth.

Because glutaraldehyde causes irritation of tissues that come into contact with it, long-term effects are similar to those experienced by short-term exposure. Your skin might also become more sensitive to glutaraldehyde if you come into repeated contact with it.

There is no evidence that glutaraldehyde causes cancer in people. One study reported increases in a type of blood cancer in rats, but an EPA cancer assessment review committee concluded that this type of cancer was common in older rats. Other animal studies found no evidence that glutaraldehyde causes cancer.

The American Conference of Governmental Industrial Hygienists determined that glutaraldehyde is not classifiable as to whether it causes cancer based on available results from animal studies. Glutaraldehyde is not on the National Toxicology Program (NTP) list of known or suspected cancer-causing substances.

HOW CAN GLUTARALDEHYDE AFFECT CHILDREN?

This section discusses potential health effects of glutaraldehyde exposure in humans from when they're first conceived to 18 years of age.

Glutaraldehyde is expected to affect children in the same manner as adults. It is not known whether children are more susceptible than adults to the effects of glutaraldehyde.

The few available reports for humans and animals have not shown that glutaraldehyde can cause birth defects.

1. PUBLIC HEALTH STATEMENT

HOW CAN FAMILIES REDUCE THEIR RISK OF EXPOSURE TO GLUTARALDEHYDE?

If your doctor finds that you have been exposed to significant amounts of glutaraldehyde, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate. You may also contact the state or local health department with health concerns.

Families are not likely to be exposed to glutaraldehyde, as it is primarily used in industrial or medical applications. However, in the event that a worker's clothing were to become soaked with glutaraldehyde, a change of clothes at the workplace would reduce the risk of exposing others outside the workplace environment.

ARE THERE MEDICAL TESTS TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO GLUTARALDEHYDE?

Although methods are available to detect glutaraldehyde in biological materials, they are not useful for estimating the magnitude of an exposure because glutaraldehyde reacts rapidly with tissues that it contacts. Also, absorbed glutaraldehyde leaves the body quickly as glutaraldehyde and/or its breakdown products.

WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. Federal agencies that develop regulations for toxic substances include the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA). Recommendations provide valuable guidelines to protect public health but are not enforceable by law. Federal organizations that develop recommendations for toxic substances include the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH).

Regulations and recommendations can be expressed as "not-to-exceed" levels; that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value usually based on levels that affect animals; levels are then adjusted to help protect humans. Sometimes these not-to-exceed levels differ among federal organizations. Different organizations use different exposure times (e.g., an 8-hour

1. PUBLIC HEALTH STATEMENT

workday or a 24-hour day), different animal studies, or emphasize some factors over others, depending on their mission.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that issued the regulation or recommendation.

EPA has no drinking water standard for glutaraldehyde. OSHA has not established an exposure limit for glutaraldehyde in air. NIOSH established a Recommended Exposure Limit (REL) of 0.2 ppm in air, as a ceiling concentration.

WHERE CAN I GET MORE INFORMATION?

If you have any questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below. You may also contact your doctor if experiencing adverse health effects or for medical concerns or questions. ATSDR can also provide publicly available information regarding medical specialists with expertise and experience recognizing, evaluating, treating, and managing patients exposed to hazardous substances.

- Call the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636) or
- Write to:
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

Toxicological profiles and other information are available on ATSDR's web site:

<http://www.atsdr.cdc.gov>.