

Ethylene Glycol

1. What is ethylene glycol?

Ethylene glycol is a colorless, odorless, sweet-tasting man-made liquid. A yellow-green dye is often mixed with ethylene glycol to aid in its identification.

2. What are the uses of ethylene glycol?

Ethylene glycol is used to make antifreeze and de-icing solutions for cars, boats, airplanes and airport runways.

Ethylene glycol is also used in solar energy systems, solvents, cosmetics, detergents, paints, hydraulic brake fluids, plastics, ball point pens, and inks used in stamp pads and print shops.

3. Is ethylene glycol present in the environment?

Ethylene glycol does not naturally occur in the environment.

Ethylene glycol can enter the environment from airport antifreeze run-off.

Ethylene glycol can also enter the environment through the improper disposal of products that contain it.

Ethylene glycol in soil, water, and air will breakdown to harmless products in several days to a few weeks.

4. How are people exposed to ethylene glycol?

The most common route of exposure to ethylene glycol is from skin contact with antifreeze solutions.

The most important route of exposure to ethylene glycol is from ingestion of antifreeze solutions.

Accidental ingestion of ethylene glycol in antifreeze, especially by young children, occurs because they are attracted to its sweet taste and color.

Ingestion of ethylene glycol can occur in adults when it is used as an alcohol (ethanol) substitute or in a suicide attempt.

Exposure to high levels of the ethylene glycol in air does not occur at room temperature.



5. How does ethylene glycol enter and leave the body?

Ethylene glycol rapidly and extensively enters the body through the gut when ingested.

Ethylene glycol slowly enters the body through the skin and is poorly absorbed through the lungs.

Absorbed ethylene glycol is widely distributed throughout the body.

The small amount of ethylene glycol that does not breakdown leaves the body in the urine within a few days.

6. How harmful is exposure to ethylene glycol?

Ethylene glycol is not as toxic as its breakdown products which can cause severe poisoning and death.

Unchanged ethylene glycol produces intoxication similar to drunkenness.

Symptoms include nausea, vomiting, dizziness, lack of muscle coordination, disorientation, irritation, restlessness, involuntary eye movement, headache, slurred speech, and drowsiness.

Ethylene glycol is mildly irritating to mucous membranes and skin and on rare occasions may cause allergic rashes.

High levels of ethylene glycol vapor (60 parts per million (ppm)) can irritate the nostrils, throat, and larynx. Airborne levels of ethylene glycol of 80 ppm and above produce severe, intolerable respiratory discomfort and cough.

Ethylene glycol's breakdown products disrupt the body's internal balance between acids and bases, and causes rapid and deep breathing. The breakdown products can damage the brain, lungs, heart, and kidneys.

7. Can exposure to ethylene glycol cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the U.S. Environmental Protection Agency (EPA) have not determined whether exposure to elevated levels of ethylene glycol causes cancer.

Human studies have not shown any link between ethylene glycol exposure and cancer.

8. Is there a medical test to show whether I've been exposed to ethylene glycol?

There are tests that measure the amount and effects of ethylene glycol in blood and urine.



9. What is the treatment for ethylene glycol poisoning?

Terminate exposure and seek rapid medical treatment in a hospital setting if the patient's condition or history suggests ethylene glycol poisoning.

Treatment is generally successful if begun within 2-3 hours of exposure (ingestion) and consists of basic life support. Hemodialysis is used to remove ethylene glycol from the blood stream. Specific antidotes, including alcohol, are used to keep ethylene glycol from being broken down in the body to toxic products.

Kidney failure, permanent damage, and death can occur if treatment is delayed.

10. Are there recommendations to protect public health?

The American College of Government Industrial Hygienists recommends a ceiling limit equal to 100 milligrams per cubic meter (mg/m³) or 39 ppm.

The U.S. Environmental Protection Agency (EPA) has a Long Term Health Advisory guideline for ethylene glycol in drinking water of 14,000 parts per billion (ppb) or 14 milligrams per liter (mg/L).

11. What can I do to prevent exposure to ethylene glycol?

Antifreeze products should never be ingested.

Antifreeze products should be used with caution and kept out of reach of children.

Minimize skin contact when using antifreeze and other products containing ethylene glycol.

12. What should I do if I believe I am ill as a result of exposure to ethylene glycol?

Ethylene glycol ingestion is a medical emergency.

Seek emergency care immediately.

Do not wait for poisoning symptoms to develop.

13. Where can I get more information?

For more information, contact:

The Pennsylvania Department of Health, Division of Environmental Health Epidemiology, P.O. Box 90, Harrisburg, Pennsylvania, 17108. Telephone number: 717-787-1708.

The U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry, Atlanta, Georgia. Telephone number: 800-232-4636.



The National Poison Control Center at telephone number 800-222-1222.

References

- (1) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, ToxFAQs™; Ethylene Glycol, September 2007.
- (2) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR). November, 2010. Toxicological Profile for Ethylene Glycol.
- (3) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR). October 3, 2007. Case Studies in Environmental Medicine (CSEM) Ethylene Glycol and Propylene Glycol.
- (4) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, ToxGuide™ for Ethylene Glycol C₂H₆O₂, CAS# 107-21-1, September 2011.
- (5) U.S. National Library of Medicine, National Institutes of Health, Medline Plus, Ethylene Glycol Intoxication; searched January 6, 2012 at <http://www.nlm.nih.gov/medlineplus/ency/article/000774.htm>.