

What is hydrogen sulfide?

Hydrogen sulfide (sewer gas) is a colorless gas with the odor of rotten eggs. The odor is detectable at concentrations as low as 0.0005 parts per million (ppm) to 0.3 ppm. Hydrogen sulfide is produced naturally by decaying organic matter and is released from crude petroleum, natural gas, volcanic gases, liquid manure, sewage sludge, landfills, and sulfur hot springs. Hydrogen sulfide is slightly heavier than air and may accumulate in enclosed, poorly ventilated, and low-lying areas.

Hydrogen sulfide is used in several industries and is a by-product of many industrial processes including oil refining, mining, tanning, wood pulp processing, food processing, craft paper production, and rayon manufacturing.

Hydrogen sulfide is added to natural gas so that residents will notice gas leaks, since natural gas on its own has no odor.

Who is exposed to hydrogen sulfide?

Inhalation is the major route of hydrogen sulfide exposure for humans. The gas is rapidly absorbed by the lungs. Although it is easily noticed from its strong smell, our noses “get used to” the smell quickly, a process called olfactory fatigue. This means that if a person does not get away from the source, they can be exposed to dangerous levels without realizing it because they can no longer smell it.

Exposure is most likely for people living or working near certain types of industrial sites, including pulp and paper mills, gas refineries, geothermal power plants, or landfills.

How can hydrogen sulfide affect my health?

The lowest concentration at which some health effects have been observed in asthmatics is at 2 ppm for 30 minutes. Low concentrations of 20-50 ppm cause irritation of the eyes; slightly higher concentrations may cause irritation of the upper respiratory tract. If exposure is prolonged, pulmonary edema may result. As concentrations approach 100 ppm, the odor becomes imperceptible because of olfactory fatigue. At a concentration of 150 ppm, the olfactory nerve is paralyzed. At higher concentrations of 200 to 300 ppm, hydrogen sulfide can be immediately life threatening.

How likely is hydrogen sulfide to cause cancer?

There are no studies that clearly show hydrogen sulfide causes cancer in humans or animals.

How can hydrogen sulfide affect children?

Because hydrogen sulfide is slightly heavier than air and tends to sink, children may be more likely to be exposed to larger amounts than adults in the same situations because they are shorter than adults. Adults and children with asthma may be especially sensitive even to low concentrations of hydrogen sulfide.

Is there a medical test to determine whether I have been exposed to hydrogen sulfide?

In cases of life-threatening hydrogen sulfide poisoning, measurements of blood sulfide or urinary thiosulfate levels may be used to confirm exposure. However, samples need to be taken within two hours of exposure.

How can I reduce the risk of exposure to hydrogen sulfide?

Hydrogen sulfide is part of the natural environment; the general population will have some exposure to hydrogen sulfide. Exposure can be reduced by avoiding natural or industrial sources of hydrogen sulfide, such as hot springs, manure holding tanks, or pulp and paper mills.

Has the federal government made recommendations to protect human health?

The American Conference of Governmental Industrial Hygienists (ACGIH) has established a threshold limit value of 10 ppm in workroom air. The Occupational Safety and Health Administration (OSHA) has established an acceptable ceiling concentration of 20 ppm for hydrogen sulfide in the workplace, with a maximum level of 50 ppm allowed for a 10 minute maximum duration. The National Institute of Occupational Safety and Health (NIOSH) recommends a maximum exposure level of 10 ppm. The Agency for Toxic Substances and Disease Registry (ATSDR) has established an acute (14-day) inhalation minimal risk level (MRL) at 0.07 ppm and an intermediate (15-364 days) inhalation MRL at 0.02 ppm. The MRL is an estimate of daily human exposure to a chemical that is likely to be without an appreciable risk of adverse, noncancerous effects over a specified duration of exposure. The U.S. Environmental Protection Agency (EPA) has derived an inhalation reference concentration (RfC) of 0.001 ppm for chronic exposure to hydrogen sulfide.

Where can I get more information on hydrogen sulfide?

- If you have concerns about hydrogen sulfide, contact your healthcare provider.
- Call your local health department. A directory of local health departments is located at <https://www.vdh.virginia.gov/local-health-districts/>. Contact the Virginia Department of Health at (804) 864-8182 or at toxicology@vdh.virginia.gov.
- Visit the Agency for Toxic Substances and Disease Registry website at <https://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=389&tid=67>.

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