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## **FREQUENTLY ASKED QUESTIONS ABOUT HYDROGEN SULFIDE**

### **What is hydrogen sulfide?**

Hydrogen sulfide (sewer gas) is a colorless gas with the odor of rotten eggs. The odor is detectable at about 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.

### **Where is hydrogen sulfide used?**

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, kraft paper production, and rayon manufacturing.

### **How might I be exposed to hydrogen sulfide?**

Inhalation is the major route of hydrogen sulfide exposure for humans. The gas is rapidly absorbed by the lungs. Although its strong odor is readily identified, olfactory fatigue occurs at higher concentrations and at continuous low concentrations. Exposure is most likely for those people living or working near certain types of industrial sites, including pulp and paper mills, gas refineries, geothermal power plants, or landfills. People are also exposed to hydrogen sulfide produced by bacteria in the mouth and gastrointestinal tract, and by enzymes in the brain and muscles. In the mouth, hydrogen sulfide levels between 0.001 to 1 ppm have been found, while the average levels recorded in intestinal gas have been between 1 and 4 ppm.

### **What are the health effects associated with hydrogen sulfide exposure?**

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?**

Given that 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.

### **What happens to hydrogen sulfide when it enters the environment?**

When released into the environment, hydrogen sulfide dissipates into the air and it may form sulfur dioxide and sulfuric acid. Hydrogen sulfide is estimated to remain in the atmosphere for about 18 hours. In some instances it may be released as a liquid waste from an industrial facility.

### **Are there any standards or guidelines to protect people from exposure to hydrogen sulfide?**

The American Conference of Governmental Industrial Hygienists has established a threshold limit value of 10 ppm in workroom air. The Occupational Safety and Health Administration (OSHA)'s 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) recommend 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 Environmental Protection Agency (EPA) has derived an inhalation reference concentration (RfC) of 0.001 ppm for chronic exposure to hydrogen sulfide. The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of the daily exposure of the human population (including sensitive subgroups) to a potential hazard that is likely to be without risk of deleterious effects during a lifetime.

### **Where can my physician or I get more information?**

If you need further information regarding the health effects of hydrogen sulfide, please contact the Virginia Department of Health, Division of Environmental Epidemiology, 109 Governor Street, 4th Floor, Richmond, VA 23219, or call (804) 864-8182.

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