

## Hydrogen Sulfide Fact Sheet

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

Hydrogen sulfide (H<sub>2</sub>S) occurs naturally in crude petroleum, natural gas, volcanic gases, and hot springs. It can also result from bacterial breakdown of organic matter. It is also produced by human and animal wastes. Bacteria found in your mouth and gastrointestinal tract produce hydrogen sulfide from bacteria decomposing materials that contain vegetable or animal proteins. Hydrogen sulfide can also result from industrial activities, such as food processing, coke ovens, kraft paper mills, tanneries, and petroleum refineries.

Hydrogen sulfide is a flammable, colorless gas with a characteristic odor of rotten eggs. It is commonly known as hydrosulfuric acid, sewer gas, and stink damp. People can smell it at low levels.

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

- Hydrogen sulfide is released primarily as a gas and spreads in the air.
- Hydrogen sulfide remains in the atmosphere for about 18 hours.
- When released as a gas, it will change into sulfur dioxide and sulfuric acid.
- In some instances, it may be released as a liquid waste from an industrial facility.

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

- You may be exposed to hydrogen sulfide from breathing contaminated air or drinking contaminated water.
- Individuals living near a wastewater treatment plant, a gas and oil drilling operation, a farm with manure storage or livestock confinement facilities, or a landfill may be exposed to higher levels of hydrogen sulfide.
- You can be exposed at work if you work in the rayon textiles, petroleum and natural gas drilling and refining, or wastewater treatment industries. Workers on farms with manure storage pits or landfills can be exposed to higher levels of hydrogen sulfide.
- A small amount of hydrogen sulfide is produced by bacteria in your mouth and gastrointestinal tract.

### **How can hydrogen sulfide affect my health?**

Exposure to low concentrations of hydrogen sulfide may cause irritation to the eyes, nose, or throat. It may also cause difficulty in breathing for some asthmatics. Brief exposures to high concentrations of hydrogen sulfide (greater than 500 ppm) can cause a loss of consciousness and possibly death. In most cases, the person appears to regain consciousness without any other effects. However, in many individuals, there may be permanent or long-term effects such as headaches, poor attention span, poor memory, and poor motor function. No health effects have been found in humans exposed to typical environmental concentrations of hydrogen sulfide (0.00011–0.00033 ppm).

Scientists have no reports of people poisoned by ingesting hydrogen sulfide. Pigs that ate feed containing hydrogen sulfide experienced diarrhea for a few days and lost weight after about 105 days.

Scientists have little information about what happens when you are exposed to hydrogen sulfide by getting it on your skin, although they know that care must be taken with the compressed liquefied product to avoid frost bite.

### **For more information, contact:**

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Hydrogen Sulfide. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Hydrogen sulfide is a mucous membrane and respiratory tract irritant; pulmonary edema, which may be immediate or delayed, can occur after exposure to high concentrations.

- ❖ Symptoms of acute exposure include nausea, headaches, delirium, disturbed equilibrium, tremors, convulsions, and skin and eye irritation.
- ❖ Inhalation of high concentrations of hydrogen sulfide can produce extremely rapid unconsciousness and death. Exposure to the liquified gas can cause frostbite injury.

## ROUTE OF EXPOSURE

<b>Synopsis:</b>	Hydrogen sulfide is a colorless, flammable, highly toxic gas. It is shipped as a liquefied, compressed gas. It has a characteristic rotten-egg odor that is detectable at concentrations as low as 0.5 ppb.
<b>Inhalation:</b>	Inhalation is the major route of hydrogen sulfide exposure. The gas is rapidly absorbed by the lungs. The odor threshold(0.5 ppb) is much lower than the OSHA ceiling (20 ppm). However, although its strong odor is readily identified, olfactory fatigue occurs at high concentrations and at continuous low concentrations. For this reason, <b>odor is not a reliable indicator of hydrogen sulfide's presence and may not provide adequate warning of hazardous concentrations.</b> Hydrogen sulfide is slightly heavier than air and may accumulate in enclosed, poorly ventilated, and low-lying areas. Children exposed to the same levels of hydrogen sulfide as adults may receive larger doses because they have greater lung surface area; body weight ratios and increased minute volumes; weight ratios. In addition, they may be exposed to higher levels than adults in the same location because of their short stature and the higher levels of hydrogen sulfide found nearer to the ground. Children may be more vulnerable to corrosive agents than adults because of the relatively smaller diameter of their airways.
<b>Skin/ Eyes:</b>	Prolonged exposure to hydrogen sulfide, even at relatively low levels, may result in painful dermatitis and burning eyes. Direct contact with the liquefied gas can cause frostbite. Absorption through intact skin is minimal.
<b>Ingestion:</b>	Because hydrogen sulfide is a gas at room temperature, ingestion is unlikely to occur.
<b>Uses:</b>	Hydrogen sulfide is produced naturally by decaying organic matter and is released from sewage sludge, liquid manure, sulfur hot springs, and natural gas. It is a by-product of many industrial processes including petroleum refining, tanning, mining, wood pulp processing, rayon manufacturing, sugar-beet processing, and hot-asphalt paving. Hydrogen sulfide is used to produce elemental sulfur, sulfuric acid, and heavy water for nuclear reactors.

<b>Hydrogen sulfide</b>		CAS 7783-06-4	
H <sub>2</sub> S		RTECS <a href="#">MX1225000</a>	
Synonyms & Trade Names: Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen		DOT ID & Guide 1053 <a href="#">117</a>	
<b>Exposure Limits</b>	NIOSH REL: C 10 ppm (15 mg/m <sup>3</sup> ) [10-minute] OSHA PEL†: C 20 ppm 50 ppm [10-minute maximum peak]		
<b>Physical Description</b>			
Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & can NOT be relied upon to warn of the continuous presence of H <sub>2</sub> S. Shipped as a liquefied compressed gas.]			
MW: 34.1	BP: -77°F	FRZ: -122°F	Sol: 0.4%
VP: 17.6 atm	IP: 10.46 eV	RGasD: 1.19	
Fl.P: NA (Gas)	UEL: 44.0%	LEL: 4.0%	
Flammable Gas			
<b>Incompatibilities &amp; Reactivities:</b> Strong oxidizers, strong nitric acid, metals			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
Skin: Frostbite		Eye: Frostbite	
Eyes: Frostbite		Skin: Frostbite	
Wash skin: Not recommendation		Breathing: Respiratory support	
Remove: When wet (flammable)			
Change: No recommendation			
Provide: Frostbite wash			
<b>Respirator Recommendations</b>			
NIOSH			
<b>Exposure Routes</b>			
inhalation, skin and/or eye contact			
<b>Symptoms</b>			
Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite			
<b>Target Organs</b>			
Eyes, respiratory system, central nervous system			