

Hydrogen Sulfide (H₂S) Fact Sheet

Hydrogen Sulfide (H₂S) The Deadliest Manure Gas

Hydrogen Sulfide (H₂S) is a colorless gas that smells like rotten eggs (from the sulphur). Often referred to as “sewer gas,” hydrogen sulfide is highly poisonous. Usually, the poisoning caused by hydrogen sulfide is through inhalation and has a toxicity similar to cyanide.

Rotting manure produces hydrogen sulfide (H₂S), methane, ammonia and carbon dioxide. H₂S is the most dangerous.

Manure being moved or stirred up releases H₂S. One or two breaths of air, with as little as 600 parts per million (ppm) H₂S, can cause a person to lose consciousness.

Deaths are not uncommon when people enter poorly ventilated spaces such as deep wells, underground tanks or sewer systems. Since H₂S gas is heavier than air, its concentration is highest near the bottom of enclosed spaces.

What happens to hydrogen sulfide when it enters the environment?

- Hydrogen sulfide is released primarily as a gas and will spread in the air
- When released as a gas, it will form sulfur dioxide and sulfuric acid in the atmosphere
- Sulfur dioxide can be broken down further and is a major component in acid rain
- Hydrogen sulfide remains in the atmosphere for about 18 hours
- In some instances, it may be released as a liquid waste from an industrial facility (factory farm)

How can hydrogen sulfide affect my health?

Hydrogen sulfide is considered a broad-spectrum poison, meaning it can poison several different systems in the body.

- **Low Levels of H₂S**

The odor of hydrogen sulfide gas can be perceived at levels as low as 10 ppb (parts per billion). At levels of 50-100 ppm (parts per million), it may cause the human sense of smell to fail. Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. These symptoms usually go away in a few weeks. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness.

- **High Levels of H₂S**

At high exposures (usually greater than 300 ppm), H₂S has the amazing effect of causing the nose to stop perceiving its smell after a few inhalations, which may lead to the inhalation of a toxic or fatal dose (which can occur at 600 ppm). Breathing very high levels of hydrogen sulfide can cause death within just a few breaths. There could be loss of consciousness after one or more breaths. At high levels, hydrogen sulfide gas may paralyze the lungs, meaning that the victim may then be unable to escape from the toxic gas without assistance.

How does hydrogen sulfide affect children?

Because it is heavier than air, hydrogen sulfide tends to sink, and because children are shorter than adults, they may be more likely to be exposed to larger amounts than adults in the same situations. It is not known whether hydrogen sulfide can cause birth defects in people. Some animal studies have shown developmental problems from exposure to hydrogen sulfide.

Continued exposure to H2S will kill you!

When released suddenly in large amounts or if allowed to build up in confined or poorly ventilated areas, toxic gases such as H2S are deadly. Every year people are killed or injured by poisonous manure gas. Manure gas accidents usually cause more than one death or injury because co-workers or relatives attempting a rescue are themselves overcome by the gas.

The hazard increases when:

- gases concentrate or build up in a confined space, or are suddenly released in a work environment
- delays in emptying pits or tanks cause manure levels to rise, bringing trapped gases closer to any workers examining a pit or tank
- hot weather speeds up manure rotting, thus increasing the amount of H2S being produced
- windless days increase the potential for localized pockets of H2S during the agitation of lagoons

Hazardous locations include:

- intermediate holding tanks between a barn and a lagoon
- pits and gutters inside barns
- lagoons

*Sources: Agency for Toxic Substances and Disease Registry (ATSDR), Atlanta, GA. 1999
Manning Safety Services, Inc., Jourdanon, TX
Alken Murray Corporation*

Toxicity of Hydrogen Sulfide Gas

0.03 ppm	Can smell. Safe for 8 hours exposure.
4 ppm	May cause eye irritation. Mask must be used as it damages metabolism.
10 ppm	Maximum exposure 10 minutes. Kills smell in 3 to 15 minutes. Gas causes eye and throat injury. Reacts violently with dental mercury amalgam fillings.
20 ppm	Exposure for more than 1 minute causes severe injury to eye nerves.
30 ppm	Loss of smell, injury to blood brain barrier through olfactory nerves
100 ppm	Respiratory paralysis in 30 to 45 minutes. Needs prompt artificial resuscitation.
	Will become unconscious quickly (15 minutes maximum).
200 ppm	Serious eye injury and permanent damage to eye nerves. Stings eye and throat.
300 ppm	Loses sense of reasoning and balance. Respiratory paralysis in 30 to 45 minutes.
500 ppm	Asphyxia! Needs prompt artificial resuscitation. Will become unconscious in 3 to 5 minutes. Immediate artificial resuscitation is required.
700 ppm	Breathing will stop and death will result if not rescued promptly, immediate unconsciousness. Permanent brain damage may result unless rescued promptly.

Chart corrected 1/12/2002, due to e-mail from a victim of H2S poisoning