

HYDROGEN SULFIDE

Questions and Answers

What is hydrogen sulfide? Hydrogen sulfide (H₂S) is a flammable, colorless gas having a characteristic odor of rotten eggs. People can smell it at very low levels. H₂S is both naturally occurring and a man-made. H₂S can be found naturally, for example, in crude oil, natural gas, and volcanic gases. It can also be emitted from rotting organic matter. It is produced by human and animal wastes. Bacteria found in your mouth and digestive tract produce hydrogen sulfide from the digestion of sulfur-containing foodstuffs. Hydrogen sulfide can also result from man-made activities, such as food processing, paper mills, wastewater treatment plants, and petroleum refineries.

How much hydrogen sulfide am I exposed to? People are most commonly exposed to hydrogen sulfide in the air during activities such as driving in traffic, living in urbanized areas or cigarette smoking. Typical levels of hydrogen sulfide in North Carolina outdoor air range from 0.000001 – 0.000007 mg/m³, with a median concentration of 0.000001 mg/m³.

Is hydrogen sulfide dangerous? Various studies have demonstrated that levels of 700 to 1,400 mg/m³ for even short time periods can be life-threatening. Exposure at these levels can cause unconsciousness and serious neurologic and respiratory effects and death. Humans can smell H₂S at very low levels, and high levels of H₂S can paralyze the nerves in the nose making detection impossible. Exposures resulting in unconsciousness (e.g., 15-30 minutes) can have persistent profound neurological, respiratory, and ophthalmologic effects. Some of these effects can occur even when the exposed individual remains conscious. The current EPA Reference Concentration (RfC), an airborne concentration of H₂S to which humans (including sensitive subgroups) can be exposed that is likely to be without an appreciable risk of harmful effects during a lifetime, is 0.002 mg/m³, a level 2000 times greater than the median North Carolina ambient air concentration. Some humans can smell H₂S at levels roughly half of the RfC.

How does the DAQ toxics program protect the public from hydrogen sulfide? The Toxics Program is designed to protect public health by limiting emissions of toxic air pollutants such as hydrogen sulfide from manmade sources. Health protective acceptable ambient level (AAL) guidelines for toxic air pollutants are established using risk assessment methods. Regulated pollution sources are then required to demonstrate that their emissions do not exceed the AAL beyond their property boundaries.

What is the AAL for hydrogen sulfide? The AAL for hydrogen sulfide is a 24-hour average value of 0.12 mg/m³. This 2005 guideline revision is based on nasal toxicity in laboratory animals.

Is the hydrogen sulfide AAL protective for acute (short-term) health effects? The current AAL for hydrogen sulfide is set more than 400 times lower than acute health effect levels.

Where can I go if I have more questions about hydrogen sulfide and the toxics program? For more information please call Lori Cherry, Toxics Protection Branch Supervisor at (919) 733-1476 or Reginald Jordan, Industrial Hygienist at (919) 733-1475.