



Emergency Contact: Chemtrec (800) 424-9300
Or Norco (208) 336-1643

1125 West Amity Road
Boise, ID 83705
(208) 336-1643

Hydrogen Sulfide in Nitrogen 0.0001% to 5.0%

MATERIAL SAFETY DATA SHEET

Identification

Product Name: Hydrogen Sulfide in Nitrogen 0.0001% to 5.0%
Chemical Name: Hydrogen Sulfide in Nitrogen
Chemical Family: Gas Mixture
CAS Number: N/A
Common Names/Synonyms: Cal. Gas, Calibration Gas
MSDS Identification Code/Number: 2100
Prepared By: Quality Department

Revision Date: 02/10/05
Last Review Date: 01/06/14

Composition, Information on Ingredients

Exposure Limits ¹:

Ingredient	% Volume	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Nitrogen Formula: N ₂ CAS Number: 7727-37-9 RTECS #: QW9700000	95.0 to 99.9999	Simple Asphyxiant	Simple Asphyxiant	Not Applicable
Hydrogen Sulfide Formula: H ₂ S CAS Number: 7783-06-4 RTECS#: MX1225000	0.0001 to 5.0	20 PPM Ceiling 50 PPM Peak (10 min. max. peak)	10 PPM TWA 15 PPM STEL	LC ₅₀ : 712 ppm Inhalation/rat 1 Hour

¹ Refer to individual state or provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 2007 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

IDLH (Hydrogen Sulfide): 100 PPM

Hazard Identification

Emergency Overview:

Colorless gas with characteristic "rotten egg" odor. Contains ≤ 5% hydrogen sulfide, a gas that is irritating to the eyes, mucous membranes and respiratory system. Hydrogen sulfide can cause respiratory paralysis, sudden collapse and death. Contents under pressure. Use and store below 125° F (52° C).

Route of Entry:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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Hazard Identification Continued

Health Effects:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen Yes	Reproductive Hazard No	Mutagen No
Synergistic Effects None reported		

Carcinogenicity: NTP: No IARC: No OSHA: No

Eye Effects:

Exposure to 20 to 50 ppm hydrogen sulfide will cause eye irritation. Low to moderately high concentrations may cause painful conjunctivitis, photophobia, lacrimation and corneal opacity. Exposure to 50 – 100 ppm hydrogen sulfide has resulted in temporary damage to the corneal epithelium in dogs, cats, rabbits, and guinea pigs. Contact with rapidly expanding gas near the point of release may cause frostbite.

Skin Effects:

Contact with hydrogen sulfide in this product may cause severe pain, itching and erythema. Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

Ingestion Effects:

Ingestion of this product is unlikely but can cause irritation of the mucous membranes and gastrointestinal tract.

Inhalation Effects:

Nitrogen acts as a simple asphyxiant displacing the oxygen content in the air necessary for life. The following effects of asphyxiation are representative and it is possible that none of these symptoms may occur: loss of balance or dizziness; tightness in the frontal area of the forehead; tingling of the tongue, fingertips or toes; weakened speech leading to the inability to utter sounds; rapid reduction in the ability to perform movements; reduced consciousness of surroundings; loss of tactile sensations; and heightened mental activity.

Hydrogen sulfide toxic effects depend on the amount inhaled and duration of exposure. Lethal concentrations of hydrogen sulfide cause respiratory paralysis and breathing stops. Life threatening pulmonary edema is common following prolonged exposure to concentrations between 250 and 600 ppm. Edema has been reported following prolonged exposure at concentrations as low as 50 ppm.

Sense of smell becomes rapidly fatigued and cannot be used as warning of exposure. Symptoms may include irritation, difficulty breathing, conjunctivitis, nervousness, cough, nausea and headache.

Medical Conditions Aggravated by Exposure:

May aggravate pre-existing eye, skin, respiratory and central nervous system (CNS) disorder.

Potential Environmental Effects:

The 96 hour TLm in the bluegill sunfish was 0.0448 mg/L in a flow-through bioassay (21 – 22^o C). The LC₅₀ for inhalation in the fly is 1500 mg/m³/7 minutes.

NFPA Hazard Codes

Health: 1
Flammability: 0
Reactivity: 0

HMIS Hazard Codes

Health: 1
Flammability: 0
Physical Hazard: 3

Ratings System

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19_2004, CGA Recommended Hazard Ratings for Compressed Gases, 2nd Edition.

First Aid Measures

Eyes:

PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush eyes with large amounts of water for at least 15 minutes holding eyelids open to ensure adequate rinsing. If irritation persists or frostbite is suspected, seek immediate medical attention.

Skin:

Remove contaminated clothing and flush affected area with large quantities of water. If irritation persists or for frostbite seek immediate medical attention.

Ingestion:

Not anticipated; product is a gas.

Inhalation:

PROMPT REMOVAL FROM THE CONTAMINATED AREA AND IMMEDIATE MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO THIS PRODUCT. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Rescue personnel should recognize the hazards of overexposure due to olfactory fatigue. Immediately remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep victim warm and calm. Further treatment should be symptomatic and supportive. Seek immediate medical attention.

Note to physician: Acute hydrogen sulfide poisoning can be treated by induction of methemoglobinemia through parenteral injection of methemoglobin generating agents (i.e.: sodium nitrite). This acts as an antidote by restoring the normal activity of the sulfide inhibited enzyme.

Fire Fighting Measures

Conditions of Flammability: Nonflammable*		
Flash point: Not Applicable	Method: Not Available	Autoignition Temperature: None
LEL(%): Not Available	UEL (%) Not Available	
Hazardous combustion products: Sulfur dioxide, irritants, toxic gases		
Sensitivity to mechanical shock: No data		
Sensitivity to static discharge: No data		

* Concentrations of $H_2S \leq 6.7\%$ in nitrogen are non-flammable (CGA P-23).

Fire and Explosion Hazards:

The majority of this product constitutes a nonflammable, inert gas. Cylinder may vent rapidly or rupture violently from pressure when exposed to a fire situation

Extinguishing Media:

Use media suitable for surrounding combustible or flammable materials.

Fire Fighting Instructions:

If possible, stop the flow of gas supply if it can be done without risk. Continue to cool surrounding containers until well after flames are extinguished. Firefighters should wear a full-facepiece, NIOSH/MSHA-approved self-contained breathing apparatus (SCBA) operated in positive pressure mode and full turnout gear.

Accidental Release Measures

Isolate hazard area, evacuate personnel and deny entry to unauthorized/unprotected individuals. Hydrogen sulfide is soluble – use water spray to knock down vapors and protect personnel. Dike run-off waters for later disposal. Personnel entering area should wear appropriate protective equipment including respiratory protection suitable for unknown concentrations. Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. Personnel should not re-enter hazard area until hydrogen sulfide has sufficiently dispersed and adequate oxygen re-established. If a leak is in user's equipment, be certain

Accidental Release Measures Continued

to purge piping with inert gas prior to attempting repairs. If leak is in container or valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/NorLab location.

Handling and Storage

Electrical Classification:

Nonhazardous.

Use only in well-ventilated areas. Valve protection caps must remain in place unless the cylinder is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure regulator when connecting cylinder to lower pressure (< 3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavy traffic areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Do not rely on olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum, Inconel®, Stellite® and 304 and 316 stainless steels. Avoid hard steels, which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide.

Hydrogen sulfide may cause lines and fittings to corrode or become brittle. Pipes and valves containing hydrogen sulfide should be inspected and adequately maintained to prevent leaks.

Never carry a compressed gas cylinder in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

For additional recommendations, consult Compressed Gas Association's Pamphlet P-1.

Exposure Controls, Personal Protection

Engineering Controls:

Use a laboratory hood with forced ventilation for handling small quantities. Use local exhaust and enclosed processes to prevent accumulation above the exposure limit and to maintain oxygen levels above 19.5%. Exhaust gas should be vented to a gas treatment system.

Eye/Face Protection:

Safety goggles or glasses or full face respirator.

Skin Protection:

Protective gloves of neoprene, butyl rubber, PVC or polyethylene should be worn.

Respiratory Protection:

For emergency release and conditions with exposures above the applicable exposure limits use a positive pressure NIOSH approved air-supplying respirator system (SCBA or airline/escape bottle) using a full face mask and a minimum of Grade D air.

Other/General Protection:

Safety shoes, safety shower and an emergency eyewash station should be available. Personnel with potential exposure to hydrogen sulfide should work in pairs, wear a gas mask with an all purpose canister or light three minute unit with a self contained air supply for instantaneous use and carry wet lead acetate paper on wrists or belt for detection of dangerous concentrations of hydrogen sulfide. (Turns black in the presence of minute amounts of hydrogen sulfide).

Physical and Chemical Properties

Parameter	Value	Units
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: Not Available	
Vapor density (Air = 1)	: Not Available	
Evaporation Point	: Not Available	
Boiling point	: Not Available	°F
	: Not Available	°C
Freezing point	: Not Available	°F
	: Not Available	°C
pH	: Not Applicable	
Specific gravity	: 1.105	
Oil/water partition coefficient	: Not Available	
Solubility (H ₂ O)	: Slightly soluble	
Odor threshold	: 0.13 ppm (for hydrogen sulfide)	
Odor and appearance	: Colorless gas. Characteristic “rotten egg” odor	

Stability and Reactivity

Stability:

Stable under normal conditions.

Conditions to Avoid:

Avoid heat, flames, ignition sources and oxidizing agents.

Incompatible Materials:

Pure hydrogen sulfide is dangerously reactive with fuming or strong nitric acid and strong oxidizers; may ignite on contact with a variety of metal oxides (i.e.: copper oxide, nickel oxide, silver (I & II) oxide, sodium peroxide); ignites in contact with fluorine and chlorine monoxide; and forms explosive reactions with oxygen difluoride, nitrogen trifluoride and many halogenic compounds.

Hazardous Decomposition Products:

Oxides of sulfur.

Hazardous Polymerization:

Will not occur.

Toxicological Information

Inhalation:

Inhalation of 1000-3000 ppm (dogs) was lethal. Respiration ceased after several breaths at 3000 ppm and death occurred within 15-20 minutes at concentrations of 1000 ppm.

Skin and Eye:

Concentrations of 50-500 ppm cause eye and respiratory irritation. Ocular toxicity has been reported at hydrogen sulfide concentrations ranging from 5-30 ppm.

Other:

Hydrogen sulfide is not considered a cumulative poison; however, headaches, fatigue, dizziness, irritability and loss of libido have been reported following chronic exposure. It is unclear whether low level exposures, repeated unmeasured acute exposures or pre-existing neurological disease are responsible for the above symptoms.

Ecological Information

Environmental Fate:

Hydrogen sulfide does not absorb solar radiation and therefore does not undergo photolysis or photochemical reaction with oxygen. Primary chemical transformation of hydrogen sulfide in the atmosphere is oxidation via oxygen containing radicals. The persistence of hydrogen sulfide in the atmosphere is dependent on season, latitude, and atmospheric conditions, ranging from 1 to 40 days with decreased temperatures and decreased levels of hydroxide in northern regions increasing residence time.

Ecological Information Continued

In soil and water, hydrogen sulfide is oxidized to elemental sulfur by microorganisms via oxidation-reduction reactions, which form part of the global sulfur cycle.

Ecotoxicity:

Product does not contain Class I or Class II ozone depleting substances. Data indicates that hydrogen sulfide is toxic to a variety of life forms including both domestic and wild animals, fish, birds, insects and plants.

Disposal Considerations

Do not attempt to dispose of waste or unused quantities in returnable cylinders. Return in the shipping container, *properly labeled, with any valve outlet plugs or caps secure and valve protection cap in place* to NorLab for proper disposal. Non-refillable containers should be vented in a well-ventilated area then disposed of in compliance with local regulations, or returned to NorLab.

Transport Information

Parameter	United States DOT	Canada TDG
Proper Shipping name:	Compressed gases, n.o.s., (Hydrogen Sulfide, Nitrogen)	Compressed gases, n.o.s.,
Hazard Class:	2.2	2.2
Identification Number:	UN 1956	UN 1956
Shipping Label:	Non-flammable Gas	Non-flammable Gas

Regulatory Information

SARA Title III Notification and Information:

SARA Title III – Hazard Classes:

Acute Health hazard
Sudden Release of Pressure Hazard

Sara Title III – Section 313 Supplier Notification:

This product contains hydrogen sulfide (CAS No. 7783-06-4), subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372.

Hydrogen sulfide is listed as an Extremely Hazardous Substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA) with a reportable quantity (RQ) of 100 pounds.

The presence of hydrogen sulfide in quantities in excess of the Threshold Planning Quantity (TQP) of 500 pounds requires certain emergency planning activities to be conducted.

Hydrogen sulfide is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

California Proposition 65:

This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.

Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

Disclaimer of Expressed and Implied Warranties:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).