1 PRODUCT AND COMPANY IDENTIFICATION

Manufacturer

NorLab - A Division of Norco, Inc.
898 W. Gowen Rd.
Boise, ID 83705

Contact: Quality Department
Phone: (208) 336-1643
Web: www.norlab-gas.com

Product Name: Hydrogen Sulfide 0.0001% - 0.0999% in Air
Revision Date: 5/28/2015
Version: 2
SDS Number: 2090
Common Name: None
CAS Number: MIXTURE
Chemical Family: Gas Mixture
Chemical Formula: H2S in Air
Synonyms: None

Emergency Telephone Number: (800) 424-9300 (CHEMTREC)

2 HAZARDS IDENTIFICATION

Inhalation: 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.

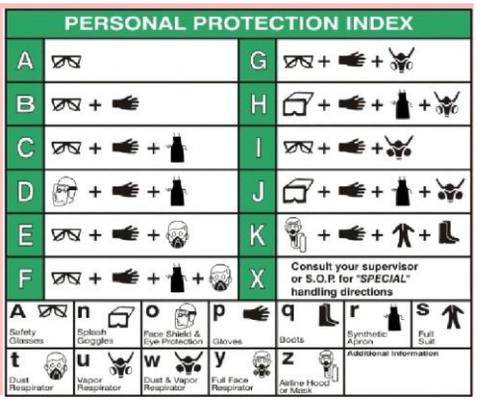
Sense of smell becomes rapidly fatigued and cannot be used as warning of exposure.

Skin Contact: May irritate the skin upon contact. Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

Eye Contact: Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photophobia, tears, pain and blurred vision. Contact with rapidly expanding gas near the point of release may cause frostbite.

Ingestion: Ingestion is unlikely. Hydrogen sulfide will irritate the mucous membranes causing a burning feeling with excess salivation likely. Irritation of the gastrointestinal tract may also occur.

NFPA: Health = 1, Fire = 0, Reactivity = 0
HMIS III: H1/F0/PH3



GHS Signal Word:
WARNING

GHS Hazard Pictograms:

GHS Classifications:
Physical, Gases Under Pressure, Compressed Gas
Health, Acute toxicity, 5 Inhalation

GHS Phrases:
H280 - Contains gas under pressure; may explode if heated
H333 - May be harmful if inhaled
CGA-HG24 – Supports Combustion

GHS Precautionary Statements:
P260 - Do not breathe dust/fume/gas/mist/vapors/spray.
P271 - Use only outdoors or in a well-ventilated area.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P304+340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P308+313 - IF exposed or concerned: Get medical advice/attention.
P403+233 - Store in a well ventilated place. Keep container tightly closed.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52 °C (125 °F).
CGA-PG05 – Use a back flow preventive device in the piping
CGA-PG06 – Close Valve after each use and when empty.
CGA-PG10 – Use only with equipment rated for cylinder pressure.
CGA-PG20 – Use only equipment of compatible materials of constructions.

Colorless gas with characteristic "rotten egg" odor. Product is a colorless non-flammable gas with a distinctive rotten egg like odor. Do not rely on smell to detect hydrogen sulfide because of olfactory fatigue. Exposure to low levels of hydrogen sulfide causes irritation of mucous membranes. Hydrogen sulfide can cause respiratory paralysis, sudden collapse and death. Contents under pressure. Use and store below 125 °F (52 °C).

IDHL: 100 ppm (H_2S)

3 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients:

CAS #	Percentage	Chemical Name
N/A	99.9-99.9999%	Air
7783-06-4	0.0001-0.0999	Hydrogen sulfide

4 FIRST AID MEASURES

Inhalation: PROMPT REMOVAL FROM THE CONTAMINATED AREA AND IMMEDIATE MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. 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 nitrile). This acts as an antidote by restoring the normal activity of the sulfide inhibited enzyme.

Skin Contact: Remove contaminated clothing and flush affected area with large quantities of water. If irritation persists or symptoms occur, seek medical attention.

Eye Contact: 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, seek immediate medical attention.

Ingestion: None anticipated; product is a gas.

Most important symptoms and effects, both acute and delayed:
The most important known symptoms and effects are described in the labelling (see Section 2) and/or Section 11.

Indication of any immediate medical attention and special treatment needed:
No data available.

5 FIRE FIGHTING MEASURES

Flammability: Not flammable
Flash Point: NA
Flash Point Method: NA
Burning Rate: Not determined
Autoignition Temp: Not determined
LEL: NA
UEL: NA

Extinguishing Media:
Use as appropriate for surrounding material.

Special Hazards Arising From the Substance or Mixture:
Hydrogen gas (trace)
Hydrogen sulfide
Nitrogen gas
Nitrogen oxides (NOx)
Oxygen gas
Sulfur Oxides

Advice for Firefighters:
Stop the flow of gas if it can be done without risk. Use water spray to cool surrounding containers. Continue to cool heat or flame exposed containers until well after the 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.

Further Information:
If incinerated, may release toxic fumes.
Use water spray to cool unopened containers.
The majority of this product is a nonflammable, inert gas. This product does contain 0.0001 - 0.1000% hydrogen sulfide, a flammable component but below its flammable limit.
Cylinders may rupture violently from pressure when involved in a fire situation.
See Section 7 for more information on safe handling.
See Section 8 for more information on personal protection equipment.
See Section 13 for disposal information.

6 ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures:
Isolate hazard area, evacuate personnel and deny entry to unauthorized/unprotected individuals. Extinguish all ignition sources and ventilate closed spaces and low areas. 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. Personnel should not re-enter an area until hydrogen sulfide has sufficiently dispersed and adequate oxygen re-established. If a leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/Norlab location.

Environmental Precautions:
Prevent further release (leakage/spillage) if safe to do so.

Methods and Materials for Containments and Cleaning Up:
Contact the appropriate emergency telephone number listed in Section 1 or call your closest Norco/Norlab location.
Ensure adequate ventilation.

Reference to Other Sections:
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for information on proper disposal.

7 HANDLING AND STORAGE

Handling Precautions: Use only in well-ventilated areas. Valve protection caps must remain in place on refillable cylinders unless 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 reducing

regulator when connecting cylinder to lower pressure 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.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid from 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.

Storage Requirements: Ensure adequate ventilation.

Protect cylinders from physical damage. Store in a 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 the 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 that the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum, Inconel ®, Stelite ®, 304 and 316 stainless steels. Avoid hard steels, which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide. Multipoint air samplers with alarms for plant production units should be provided to constantly monitor the air in and around the units.

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

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: All ventilation should be designed in accordance with OSHA standard (29 CFR 1910.94). Use local exhaust at filling zones and where leakage and dust formation is probable. Use mechanical (general) ventilation for storage areas. Use appropriate ventilation as required to keep Exposure limits in Air below TLV & PEL limits. Maintain atmospheric Oxygen content at or above 19.5%

Personal Protective Equip: Eye/face protection:
When using material use safety goggles, gloves and vapor respirator according to HMIS, PP G. Use of a face shield according to HMIS, PP O is also highly recommended. All safety equipment should be tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin protection:
Handle with protective gloves made from Neoprene, butyl rubber, PVC or polyethylene. Gloves must be inspected prior to use. Dispose of contaminated gloves according to applicable laws and workplace practices.

Body Protection:
Chemically resistant gloves, safety goggles and face shield are recommended. Type of protective equipment should be selected based on concentration amount and conditions of use of this material. Use safety shoes.

Respiratory protection:
Use of a vapor respirator is highly recommended. A NIOSH/MSHA-approved full-face piece

SCBA operated in positive mode and/or any supplied air respirator with a full-face piece and operated in a positive pressure mode in combination with an auxiliary self contained breathing apparatus operated in positive pressure mode should be used for high or unknown concentrations. Respirators should be stored in an area not likely to be contaminated.

Control of environmental exposure:
Prevent leakage or spillage if safe to do so. Safety shoes, safety showers 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).

Components with workplace control parameters:

Component(s): Air; Hydrogen Sulfide
CAS No(s): N/A; 7783-06-4
USA NIOSH (C/REL): 10.0 ppm
USA ACGIH (TWA/TLV): 1.0 ppm
USA ACGIH (STEL/TLV): 5.0 ppm
USA OSHA Occupational Exposure Limits Table Z-2 (CEII): 20.0 ppm
USA OSHA Occupational Exposure Limits Table Z-2 (Peak): 50.0 ppm

Biological occupational exposure limits:

Contains no substances with biological occupational exposure limit values.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Clear, colorless gas		
Physical State:	Gas	**Odor:**	Rotten egg
Odor Threshold:	0.13 ppm	**Molecular Formula:**	MIXTURE
Particle Size:	Not determined	**Solubility:**	Slightly soluble
Spec Grav./Density:	No data available	**Softening Point:**	Not determined
Viscosity:	Not determined	**Percent Volatile:**	100%
Sat. Vap. Conc.:	Not determined	**Heat Value:**	Not determined
Boiling Point:	Not determined	**Freezing/Melting Pt.:**	Not determined
Flammability:	(solid, gas): No data available	**Flash Point:**	Not determined
Partition Coefficient:	Not determined	**Octanol:**	Not determined
Vapor Pressure:	Not determined	**Vapor Density:**	(air = 1): Not determined
pH:	Not determined	**VOC:**	NA
Evap. Rate:	Not determined	**Bulk Density:**	NA
Molecular weight:	MIXTURE	**Auto·Ignition Temp:**	Not determined
Decomp Temp:	Not determined	**UFL/LFL:**	NA

10 STABILITY AND REACTIVITY

Stability:	Product is stable under normal conditions.
Conditions to Avoid:	Incompatibilities, flames, ignition sources.
Materials to Avoid:	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:	Nitrogen Oxides (NOx) and Sulfur Oxides.
Hazardous Polymerization:	Will not occur.

11 TOXICOLOGICAL INFORMATION

Component(s): Air; Hydrogen Sulfide
CAS No(s): N/A; 7783-06-4

Acute Toxicity:
LC50 Inhalation - Rat: 712 ppm (1 h)
LC50 Inhalation - Mouse: 634 ppm (1 h)
LC50 Inhalation - Dog: 1000 - 3000 ppm (15 min)

Skin Corrosion/Irritation: Causes mild skin irritation.

Serious Eye Damage/Eye Irritation: May cause eye irritation. Concentrations of 50 - 500 ppm cause eye irritation. Ocular toxicity has been reported at concentration ranging from 5 - 30 ppm.

Respiratory or Skin Sensitation: No data available.

Germ Cell Mutagenicity: No data available.

Carcinogenicity:

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by IARC.
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by NTP.
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive Toxicity:
Reproductive Toxicity Inhalation - Rat: Effects on newborn (physical).

Specific Target Organ Toxicity · Single Exposure: Respiratory System - Concentrations of 50 - 500 ppm cause respiratory irritation.

Specific Target Organ Toxicity · Repeated Exposure: No data available.

Aspiration Hazard: No data available.

Additional Information:
Component: Air; RTECS: N/A
Component: Hydrogen Sulfide; RTECS: MX1225000

12 ECOIOGICAL INFORMATION

Component(s): Air; Hydrogen Sulfide
CAS No(s): N/A; 7783-06-4

Toxicity:

Toxicity to fish:
LC50 - Pimephales promelas (Fathead Minnow): 0.016 mg/l (96 h)

Toxicity to daphnia and other aquatic invertebrates:
No data available.

Persistence and Degradability:
Hydrogen sulfide does not absorb solar radiation and therefore does not undergo photolysis or photochemical reaction with oxygen. 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.

Bioaccumulative Potential:
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.

Mobility in Soil:
No data available.

Results of PBT and vPvB assessment:
Not required/conducted.

Other Adverse Effects:
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Very toxic to aquatic life. Product does not contain Class I or Class II ozone depleting substances.

13 DISPOSAL CONSIDERATIONS

Product and Contaminated Packaging: Do not attempt to dispose of residual waste or unused quantities in returnable containers. 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.

14 TRANSPORT INFORMATION

DOT Class: Non-Flammable Gas (2.2) #2.2
UN #: UN 1956, Class: 2, Proper Shipping Name: Compressed gas, n.o.s. (Hydrogen Sulfide, Air)

DOT (US)
UN Number: 1956

Class: 2.2
ERG #: 126
Proper Shipping Name: Compressed gas, n.o.s. (Hydrogen Sulfide, Air)

IMDG
UN Number: 1956
Class: 2
EMS-No: F-C, S-V
Proper Shipping Name: Compressed gas, n.o.s. (Hydrogen Sulfide, Air)

IATA
UN Number: 1956
Class: 2
Proper Shipping Name: Compressed gas, n.o.s. (Hydrogen Sulfide, Air)

Canada TDG
UN Number: 1956
Class: 2.2
Proper Shipping Name: Compressed gas, n.o.s. (Hydrogen Sulfide, Air)

15 REGULATORY INFORMATION

COMPONENT / (CAS/PERC) / CODES
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*Air (N/A 99.9-99.9999%) MASS, NJHS, PA, SARA311/312, TSCA

*Hydrogen sulfide (7783064 0.0001-0.0999%) CERCLA, CSWHS, EHS302, HAP, MASS, NJEHS, NJHS, OSHAPSM, OSHAWAC, PA, SARA311/312, SARA313, TOXICRCRA, TSCA, TXAIR, TXHWL

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.

Hydrogen sulfide is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA). The presence of hydrogen sulfide in quantities in excess of the threshold planning quantity (TPQ) of 500 pounds requires certain emergency planning activities to be conducted.

Releases of hydrogen sulfide in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the national Response Center under CERCLA, Section 304 SARA Title III.

REGULATORY KEY DESCRIPTIONS

CERCLA = Superfund clean up substance
CSWHS = Clean Water Act Hazardous substances
EHS302 = Extremely Hazardous Substance
HAP = Hazardous Air Pollutants
MASS = MA Massachusetts Hazardous Substances List
NJEHS = NJ Extraordinarily Hazardous Substances
NJHS = NJ Right-to-Know Hazardous Substances
OSHAPSM = OSHA Chemicals Requiring process safety management
OSHAWAC = OSHA Workplace Air Contaminants

PA = PA Right-To-Know List of Hazardous Substances
SARA311/312 = SARA 311/312 Toxic Chemicals
SARA313 = SARA 313 Title III Toxic Chemicals
TOXICRCRA = RCRA Toxic Hazardous wastes (U-List)
TSCA = Toxic Substances Control Act
TXAIR = TX Air Contaminants with Health Effects Screening Level
TXHwL = TX Hazardous waste List

16 OTHER INFORMATION

Disclaimer:

The data in this Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material in any process. The information set forth herein is furnished free of charge and is based on technical data that Norlab believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside of Norlab's control, Norlab makes no warranties, expressed or implied, and assumes no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under, or a recommendation to infringe upon, any patents.