



HYDROGEN SULFIDE

Safety Data Sheet

1. IDENTIFICATION

Product identifier

Product Name HYDROGEN SULFIDE

Other means of identification

Safety data sheet number LIND-P071
 UN/ID no. UN1053
 Synonyms Dihydrogen Sulfide; Sulfur Hydride; Hydrogen Sulphide

Recommended use of the chemical and restrictions on use

Recommended Use Industrial and professional use.
 Uses advised against Consumer use

Details of the supplier of the safety data sheet

Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC
 575 Mountain Ave.
 Murray Hill, NJ 07974
 Phone: 908-464-8100
www.lindeus.com

Linde Gas Puerto Rico, Inc.
 Road 869, Km 1.8
 Barrio Palmas, Catano, PR 00962
 Phone: 787-641-7445
www.pr.lindegas.com

Linde Canada Limited
 5860 Chedworth Way
 Mississauga, Ontario L5R 0A2
 Phone: 905-501-1700
www.lindecana.com

* May include subsidiaries or affiliate companies/divisions.

For additional product information contact your local customer service.

Emergency telephone number

Company Phone Number 800-232-4726 (Linde National Operations Center, US)
 905-501-0802 (Canada)

CHEMTREC: 1-800-424-9300 (North America) +1-703-527-3887 (International)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Acute toxicity - Inhalation (Gases)	Category 2
Specific target organ toxicity (single exposure)	Category 3
Flammable gases	Category 1
Gases under pressure	Liquefied gas

Label elements



Signal word

Danger

Hazard Statements

Extremely flammable gas

Contains gas under pressure; may explode if heated

Fatal if inhaled

May cause respiratory irritation

Very toxic to aquatic life

May form explosive mixtures with air

Symptoms may be delayed

Extended exposure to gas reduces the ability to smell sulfides

Precautionary Statements - Prevention

Do not handle until all safety precautions have been read and understood

Keep away from heat, sparks, open flames, hot surfaces. — No smoking

Do not breathe gas.

Use and store only outdoors or in a well ventilated place

Avoid release to the environment

Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection

Use backflow preventive device in piping

Use only with equipment of compatible materials of construction and rated for cylinder pressure

Do not open valve until connected to equipment prepared for use

Close valve after each use and when empty

When returning cylinder, install leak tight valve outlet cap or plug

Do not depend on odor to detect presence of gas

Precautionary Statements - Response

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.

Leaking gas fire: do not extinguish, unless leak can be stopped safely

Eliminate all ignition sources if safe to do so

Precautionary Statements - Storage

Store locked up

Protect from sunlight when ambient temperature exceeds 52°C/125°F

Precautionary Statements - Disposal

Dispose of contents/containers in accordance with container supplier/owner instructions

Hazards not otherwise classified (HNOC)

Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Volume %	Chemical Formula
Hydrogen sulfide	7783-06-4	100	H ₂ S

4. FIRST AID MEASURESDescription of first aid measures

General advice	Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.
Inhalation	Remove to fresh air and keep comfortable for breathing. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get medical attention immediately.
Skin contact	Wash off immediately with plenty of water. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.
Eye contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.
Ingestion	Not an expected route of exposure.
Self-protection of the first aider	Remove all sources of ignition. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Most important symptoms and effects, both acute and delayed

Symptoms	May cause central nervous system effects such as headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure and death. Hydrogen sulfide gas between 15 and 500 ppm can cause headache, nausea and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. Irritating to eyes, respiratory system and skin. Symptoms may be delayed.
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Indication of any immediate medical attention and special treatment needed

Note to physicians	Acute hydrogen sulfide poisoning can be treated by induction of methemoglobinemia through parenteral injection of methemoglobin generating agents (sodium nitrite). This acts as an antidote by restoring the normal activity of the sulfide inhibited enzyme.
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Advice on safe handling

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 tests to be certain that the exposure limits are 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. Automated multi-point air samplers with alarms for plant production units should be provided to constantly monitor the air in and around units. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground and bond all lines and equipment associated with product system. All equipment should be non-sparking and explosion proof. Separate flammable gas cylinders from oxygen and other oxidizers by a minimum distance of 20 ft. or by a 5 ft. high barrier with a minimum fire resistance rating of a half an hour. "NO SMOKING" signs should be posted in storage and use areas.

When moving cylinders, even for short distance, use a cart designed to transport cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. Never attempt to lift a cylinder by its valve protection cap. Use backflow preventive device in piping. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Use only with adequate ventilation. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Ensure the complete gas system has been checked for leaks before use.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Only experienced and properly instructed persons should handle gases under pressure. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

For additional recommendations, consult Compressed Gas Association's Pamphlet G-12.

Conditions for safe storage, including any incompatibilities**Storage Conditions**

Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. 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. Stored containers should be periodically checked for general condition and leakage. Outside or detached storage is preferred.

Incompatible materials

Oxidizing agents. Nitric acid.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters**Exposure Guidelines**

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Hydrogen sulfide 7783-06-4	STEL: 5 ppm TWA: 1 ppm	(vacated) TWA: 10 ppm (vacated) TWA: 14 mg/m ³ (vacated) STEL: 15 ppm (vacated) STEL: 21 mg/m ³ Ceiling: 20 ppm	IDLH: 100 ppm Ceiling: 10 ppm 10 min Ceiling: 15 mg/m ³ 10 min

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value. OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits. NIOSH IDLH: Immediately Dangerous to Life or Health

Other Information

Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate engineering controls

Engineering Controls Showers. Eyewash stations. Explosion proof ventilation systems. Exhaust gas should be vented to a gas treatment system. Consider installation of leak detection systems in areas of use and storage. Systems under pressure should be regularly checked for leakages.

Individual protection measures, such as personal protective equipment

Eye/face protection Tightly fitting safety goggles. Face-shield.

Skin and body protection Work gloves and safety shoes are recommended when handling cylinders. Wear fire/ flame resistant/retardant clothing. Take precautionary measures against static discharge. Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction consult protective clothing manufacturer's specifications.

Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash hands before breaks and immediately after handling the product. Regular cleaning of equipment, work area and clothing is recommended. Contaminated work clothing should not be allowed out of the workplace.

9. PHYSICAL AND CHEMICAL PROPERTIESInformation on basic physical and chemical properties

Physical state	Gas
Appearance	Colorless.
Odor	Rotten-egg like.
Odor threshold	0.13 ppm (Hydrogen sulfide)* see note
pH	If dissolved in water, will affect pH value
Melting point	-82.2 °C / -117.8 °F
Evaporation rate	Not applicable
Fire Hazard	Yes
Lower flammability limit:	4%
Upper flammability limit:	44%
Flash point	No information available
Autoignition temperature	290 °C / 554 °F
Decomposition temperature	No data available
Water solubility	Soluble in water.
Partition coefficient	0.45
Kinematic viscosity	Not applicable

Chemical Name	Molecular weight	Boiling point	Vapor Pressure	Vapor density (air =1)	Gas Density kg/m ³ @20°C	Critical Temperature
Hydrogen sulfide	34.08	-60.3 °C	18100 hPa @ 20 °C	1.19	1.427	100.5 °C

Note: Extended exposure to gas reduces the ability to smell sulfides Do not depend on odor to detect presence of gas

10. STABILITY AND REACTIVITYReactivity

Not reactive under normal conditions

Chemical stability

Stable under recommended storage conditions.

Explosion data

Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge Yes.

Possibility of Hazardous Reactions

May form explosive mixtures with air.

Conditions to avoid

Ignitions sources - heat, sparks and open flames. Vapors will ignite spontaneously when mixed with vapors or chlorine, oxygen difluoride or nitrogen trifluoride.

Incompatible materials

Oxidizing agents. Nitric acid.

Hazardous Decomposition Products

Sulfur oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation Toxic by inhalation. May cause respiratory irritation.

Skin contact Irritating to skin. Contact with liquid may cause cold burns/frostbite.

Eye contact May cause irritation. Ocular toxicity has been reported at hydrogen sulfide concentrations ranging from 5-30 ppm. Contact with liquid may cause cold burns/frostbite.

Ingestion Not an expected route of exposure.

Information on toxicological effects

Symptoms May cause central nervous system effects such as headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure and death. Hydrogen sulfide gas between 15 and 500 ppm can cause headache, nausea and dizziness. Continued exposure at these levels can lead to loss of reasoning and balance, difficulty in breathing, fluid in the lungs, and possible loss of consciousness. Greater than 500 ppm can cause rapid unconsciousness due to respiratory paralysis and death by suffocation. Greater than 1000 ppm can cause immediate unconsciousness and death if not promptly revived. Symptoms may be delayed.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Concentrations of 50-500 ppm cause eye and respiratory irritation.

Sensitization Not classified.

Germ cell mutagenicity Not classified.

Carcinogenicity This product does not contain any carcinogens or potential carcinogens listed by OSHA, IARC or NTP.

Reproductive toxicity Not classified.

STOT - single exposure Category 3. May cause respiratory irritation.

STOT - repeated exposure Not classified.

 Target Organ Effects Respiratory system, Eyes, Central nervous system (CNS).

Aspiration hazard Not applicable.

Numerical measures of toxicity

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50	Inhalation LC50 (CGA P-20)

Hydrogen sulfide 7783-06-4	-	-	712 ppm/1 hr (Rat)	712 ppm (Rat) 1hr
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Product Information

Oral LD50	No information available
Dermal LD50	No information available
Inhalation LC50	No information available

The following values are calculated based on chapter 3.1 of the GHS document .

12. ECOLOGICAL INFORMATION

This product contains a chemical which is listed as a marine pollutant according to DOT.

Ecotoxicity

Very toxic to aquatic organisms. May cause pH changes in in aqueous ecological systems.

Chemical Name	Algae/aquatic plants	Fish	Crustacea
Hydrogen sulfide 7783-06-4	-	0.0448: 96 h Lepomis macrochirus mg/L LC50 flow-through 0.016: 96 h Pimephales promelas mg/L LC50 flow-through	0.022: 96 h Gammarus pseudolimnaeus mg/L LC50

Persistence and degradability

Not applicable.

Bioaccumulation

No information available.

Chemical Name	Partition coefficient
Hydrogen sulfide 7783-06-4	0.45

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde for proper disposal.

14. TRANSPORT INFORMATION

DOT

UN/ID no.	UN1053
Proper shipping name	Hydrogen sulfide
Hazard Class	2.3
Subsidiary class	1
Special Provisions	2, B9, B14, N89
Marine pollutant	This product contains a chemical which is listed as a marine pollutant according to DOT.
Description	UN1053, Hydrogen sulfide, 2.3 (1), Marine Pollutant
Additional Description:	"Toxic-Inhalation Hazard Zone B" If net weight of product is greater than or equal to 100 lbs., the shipping description must also contain the letters "RQ".
Additional Marking Requirements:	"Inhalation Hazard" If net weight of product is greater than or equal to 100 lbs., the container must also be marked with the letters "RQ".
Emergency Response Guide Number	117

TDG

UN/ID no.	UN1053
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Proper shipping name	Hydrogen sulfide
Hazard Class	2.3
Subsidiary class	2.1
Marine pollutant	This product contains a chemical which is listed as a marine pollutant according to TDG.
Description	UN1053, Hydrogen sulfide, 2.3 (1), Marine Pollutant

MEX

UN/ID no.	UN1053
Proper shipping name	Hydrogen sulphide
Hazard Class	2.3
Subsidiary class	2.1
Description	UN1053, Hydrogen sulphide, 2.3 (1)

IATA

Forbidden

IMDG

UN/ID no.	UN1053
Proper shipping name	Hydrogen sulphide
Hazard Class	2.3
Subsidiary hazard class	2.1
EmS-No.	F-D, S-U
Marine pollutant	This product contains a chemical which is listed as a marine pollutant according to IMDG/IMO
Description	UN1053, Hydrogen sulphide, 2.3 (1), Marine Pollutant

ADR

UN/ID no.	UN1053
Proper shipping name	Hydrogen sulphide
Hazard Class	2.3
Classification code	2TF
Tunnel restriction code	(B/D)
Description	UN1053, Hydrogen sulphide, 2.3 (2.1), (B/D)
Labels	2.1

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

US Federal RegulationsSARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical Name	SARA 313 - Threshold Values %
Hydrogen sulfide - 7783-06-4	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden release of pressure hazard	Yes

Reactive Hazard

No

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Hydrogen sulfide 7783-06-4	100 lb	100 lb	100 lb 45.4 kg

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CWA (Clean Water Act)

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Hydrogen sulfide 7783-06-4	100 lb	-	-	X

Risk and Process Safety Management Programs

This material, as supplied, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Hydrogen sulfide	10000 lb		1500 lb

US State RegulationsCalifornia Proposition 65

This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Hydrogen sulfide 7783-06-4	X	X	X

International Regulations

Chemical Name	Carcinogenicity	Exposure Limits
Hydrogen sulfide		Mexico: TWA 10 ppm Mexico: TWA 14 mg/m ³ Mexico: STEL 15 ppm Mexico: STEL 21 mg/m ³

Chemical Name	NPRI
Hydrogen sulfide	X

Legend

Canada NPRI - National Pollutant Release Inventory

16. OTHER INFORMATION

NFPA Health hazards 4 Flammability 4 Instability 0 Physical and Chemical Properties -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

Issue Date 03-Mar-2015
Revision Date 03-Mar-2015
Revision Note Initial Release.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet