

Section 1. Chemical product and company identification

Product name	: Hydrogen Sulfide
Supplier	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Product use	: Synthetic/Analytical chemistry.
Synonym	: Dihydrogen monosulfide; Dihydrogen sulfide; Hydrosulfuric acid; Stink damp; Sulfur hydride; Sulfureted hydrogen; H ₂ S; Sulfuretted hydrogen; Hydrogen-sulphide-; Hydrogen sulfide (H ₂ S); Acide sulfhydrique; Hydrogene sulfure; Idrogeno solforato; Rcra waste number U135; Schwefelwasserstoff; Siarkowodor; UN 1053; Zwavelwaterstof; Hepatic gas; Hepatic acid; Hydrogen monosulfide; Sewer gas; Sour gas; Sulfur hydroxide
MSDS #	: 001029
Date of Preparation/Revision	: 5/7/2013.
In case of emergency	: 1-866-734-3438

Section 2. Hazards identification

Physical state	: Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH A ROTTEN EGG ODOR, BUT ODORLESS AT POISONOUS CONCENTRATIONS. [NOTE: SENSE OF SMELL BECOMES RAPIDLY FATIGUED AND CAN NOT BE RELIED UPON TO WARN OF THE CONTINUOUS PRESENCE OF H ₂ S.]]
Emergency overview	: DANGER! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY BE FATAL IF INHALED. MAY CAUSE EYE AND SKIN IRRITATION. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not breathe gas. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
Target organs	: May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).
Routes of entry	: Inhalation Dermal Eyes
Potential acute health effects	
Eyes	: Moderately irritating to eyes. Contact with rapidly expanding gas may cause burns or frostbite.
Skin	: Moderately irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite.
Inhalation	: Very toxic by inhalation.
Ingestion	: Ingestion is not a normal route of exposure for gases
Potential chronic health effects	
Chronic effects	: Can cause target organ damage.
Target organs	: May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).

Hydrogen Sulfide

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Hydrogen Sulfide	7783-06-4	100	ACGIH TLV (United States, 3/2012). STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). NIOSH REL (United States, 1/2013). CEIL: 15 mg/m ³ 10 minute(s). CEIL: 10 ppm 10 minute(s). OSHA PEL 1989 (United States, 3/1989). STEL: 21 mg/m ³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m ³ 8 hour(s). TWA: 10 ppm 8 hour(s). OSHA PEL Z2 (United States, 11/2006). AMP: 50 ppm 10 minute(s). CEIL: 20 ppm

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Call medical doctor or poison control center immediately. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

- Flammability of the product** : Flammable.
- Auto-ignition temperature** : 259.85°C (499.7°F)
- Flammable limits** : Lower: 4% Upper: 44%
- Products of combustion** : Decomposition products may include the following materials:
sulfur oxides
- Fire-fighting media and instructions** : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

- Handling** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Avoid contact with skin and clothing. Avoid contact with eyes. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

- Engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

hydrogen sulphide

ACGIH TLV (United States, 3/2012).

STEL: 5 ppm 15 minute(s).

TWA: 1 ppm 8 hour(s).

NIOSH REL (United States, 1/2013).

CEIL: 15 mg/m³ 10 minute(s).

CEIL: 10 ppm 10 minute(s).

OSHA PEL 1989 (United States, 3/1989).

STEL: 21 mg/m³ 15 minute(s).

STEL: 15 ppm 15 minute(s).

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TWA: 14 mg/m³ 8 hour(s).
TWA: 10 ppm 8 hour(s).
OSHA PEL Z2 (United States, 11/2006).
AMP: 50 ppm 10 minute(s).
CEIL: 20 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight	: 34.08 g/mole
Molecular formula	: H ₂ S
Boiling/condensation point	: -60°C (-76°F)
Melting/freezing point	: -82.8°C (-117°F)
Critical temperature	: 100.5°C (212.9°F)
Vapor pressure	: 252 (psig)
Vapor density	: 1.19 (Air = 1)
Specific Volume (ft³/lb)	: 11.236
Gas Density (lb/ft³)	: 0.089

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Extremely reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
hydrogen sulphide	LD50 Intraperitoneal	Rat	2300 ug/kg	-
	LD50 Intravenous	Rat	270 ug/kg	-
	LC50 Inhalation	Rat	820 mg/m ³	3 hours
	Vapor			
	LC50 Inhalation	Rat	700 mg/m ³	4 hours
	Vapor			
	LC50 Inhalation	Rat	470 mg/m ³	6 hours
	Vapor			
	LC50 Inhalation	Rat	712 ppm	1 hours
	Gas.			
LC50 Inhalation	Mouse	634 ppm	1 hours	
Gas.				
LC50 Inhalation	Rat	444 ppm	4 hours	
Gas.				

IDLH	: 100 ppm
Chronic effects on humans	: May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).
Other toxic effects on humans	: No specific information is available in our database regarding the other toxic effects of this material to humans.
Specific effects	
Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
hydrogen sulphide	-	Acute EC50 770 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. lauren - 10 mm	48 hours
	-	Acute EC50 540 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis ssp. lauren - 10 mm	48 hours
	-	Acute EC50 95 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 71 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute EC50 62 ug/L Fresh water	Crustaceans - Scud - Gammarus pseudolimnaeus - 11 mm	2 days
	-	Acute LC50 4 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 3.2 ug/L Fresh water	Fish - Asian redtail catfish - Hemibagrus nemurus	96 hours
	-	Acute LC50 3 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 2 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
-	Acute LC50 <2 ug/L Fresh water	Fish - Yellow perch - Perca flavescens - Yolk- sac fry	96 hours	

Products of degradation :

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).	 	<p>Reportable quantity 100 lbs. (45.4 kg)</p> <p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: Forbidden.</p> <p>Cargo aircraft Quantity limitation: Forbidden.</p> <p>Special provisions 2, B9, B14</p>
TDG Classification	UN1053	HYDROGEN SULFIDE; OR HYDROGEN SULPHIDE	2.3	Not applicable (gas).	 	<p>Explosive Limit and Limited Quantity Index 0</p> <p>ERAP Index 0</p> <p>Passenger Carrying Ship Index Forbidden</p> <p>Passenger Carrying Road or Rail Index Forbidden</p>

Hydrogen Sulfide						
Mexico Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).	 	-

“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

Section 15. Regulatory information

United States

- U.S. Federal regulations** : **United States inventory (TSCA 8b):** This material is listed or exempted.
SARA 302/304/311/312 extremely hazardous substances: hydrogen sulphide
SARA 302/304 emergency planning and notification: hydrogen sulphide
SARA 302/304/311/312 hazardous chemicals: hydrogen sulphide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: hydrogen sulphide: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: hydrogen sulphide

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: Hydrogen Sulfide	7783-06-4	100
Supplier notification	: Hydrogen Sulfide	7783-06-4	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

- State regulations** : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

- WHMIS (Canada)** : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

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CEPA Toxic substances: This material is not listed.

Canadian ARET: This material is not listed.

Canadian NPRI: This material is listed.

Alberta Designated Substances: This material is not listed.

Ontario Designated Substances: This material is not listed.

Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements

: FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY BE FATAL IF INHALED.
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

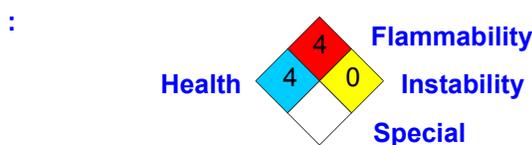
Label requirements

: Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.)

Health	*	4
Flammability		4
Physical hazards		0

National Fire Protection Association (U.S.A.)



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.