Safety Data Sheet

Section 1: Identification

Product identifier

Product Name • **Hydrogen Sulfide (14.2501 - 49.9999%), Carbon Dioxide (Balance)**

Product Code • SDS No.: M-H20008/E-1

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Test Gas/Calibration Gas

Details of the supplier of the safety data sheet

Manufacturer • Air Liquide

2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com
sds@airliquide.com

Telephone (Technical) • 713-896-2896

Telephone (Technical) • 800-819-1704

Emergency telephone number

Manufacturer • 800-424-9300 - CHEMTREC

Manufacturer • +1 703-527-3887 - Outside United States

Section 2: Hazard Identification

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Flammable Gases 1 - H220
Compressed Gas - H280
Acute Toxicity Inhalation 3 - H331
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335

Label elements

OSHA HCS 2012

DANGER

Hazard statements • Extremely flammable gas - H220
Contains gas under pressure; may explode if heated - H280
Toxic if inhaled - H331
May cause respiratory irritation - H335

Precautionary statements

Prevention

- Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking. - P210
  Avoid breathing fume/gas. - P261
  Use only outdoors or in a well-ventilated area. - P271

Response

- Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - P377
  Eliminate all ignition sources if safe to do so. - P381
  IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340
  Call a POISON CENTER or doctor/physician. - P311
  Specific treatment, see supplemental first aid information. - P321

Storage/Disposal

- Store in a well-ventilated place. Keep container tightly closed. - P403+P233
  Store locked up. - P405
  Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

Other hazards

OSHA HCS 2012

- Mixtures containing carbon dioxide can increase respiration and heart rate. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

Classification of the substance or mixture

WHMIS

- Compressed Gas - A
  Flammable Gases - B1
  Very Toxic - D1A
  Other Toxic Effects - D2B

Label elements

WHMIS

- Compressed Gas - A
  Flammable Gases - B1
  Very Toxic - D1A
  Other Toxic Effects - D2B

Other hazards

WHMIS

- Mixtures containing carbon dioxide can increase respiration and heart rate.
  In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Other information

NFPA

Section 3 - Composition/Information on Ingredients

Substances

- Material does not meet the criteria of a substance.

Mixtures

Composition				
Chemical Name	**Identifiers**	**%**	**LD50/LC50**	**Classifications According to Regulation/Directive**
Carbon dioxide	**CAS:**124-38-9	Balance	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	**OSHA HCS 2012:** Press. Gas - Comp.; Simp. Asphyx.
Hydrogen sulfide	**CAS:**7783-06-4	14.2501% TO 49.9999%	Inhalation-Rat LC50 • 444 ppm	**OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Acute Tox 2 (inhl)

Section 4: First-Aid Measures

Description of first aid measures

Inhalation
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin
- Although exposure is unlikely, in case of contact immediately flush skin with running water. If skin irritation develops get medical advice/attention.

Eye
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If eye irritation persists: Get medical advice/attention.

Ingestion
- Ingestion is not considered a potential route of exposure.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media
- SMALL FIRES: Dry chemical or CO2.
  LARGE FIRES: Water spray or fog.

Unsuitable Extinguishing Media
- No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion
- EXTREMELY FLAMMABLE

Hazards

Will form explosive mixtures with air.
Vapors may travel to source of ignition and flash back.
Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
Containers may explode when heated.
Ruptured cylinders may rocket.

Hazardous Combustion Products

- Toxic fumes of sulfur oxides and carbon monoxide.

Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
Wear positive pressure self-contained breathing apparatus (SCBA).
DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED
Move containers from fire area if you can do it without risk.
FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.
FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.
FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.
FIRE INVOLVING TANKS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions

- Ventilate the area before entry. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile) Keep unauthorized personnel away. Keep out of low areas. Stay upwind.

Environmental precautions

- Prevent spreading of vapors through sewers, ventilation systems and confined areas.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- All equipment used when handling the product must be grounded.
Stop leak if you can do it without risk.
If possible, turn leaking containers so that gas escapes rather than liquid.
Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
Do not direct water at spill or source of leak.
Isolate area until gas has dispersed.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation.

Ventilate closed spaces before entering. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing gas. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

Conditions for safe storage, including any incompatibilities

Storage

- Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52C (125F). Cylinders must be protected from the environment, and preferably kept at room temperature approximately 21C (70F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over. Store locked up.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines						
	Result	**ACGIH**	**Canada Ontario**	**Canada Quebec**	**NIOSH**	**OSHA**
Carbon dioxide (124-38-9)	STELs	30000 ppm STEL	30000 ppm STEL	30000 ppm STEV; 54000 mg/m3 STEV	30000 ppm STEL; 54000 mg/m3 STEL	Not established
	TWAs	5000 ppm TWA	5000 ppm TWA	5000 ppm TWAEV; 9000 mg/m3 TWAEV	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA
Hydrogen sulfide (7783-06-4)	STELs	5 ppm STEL	15 ppm STEL	15 ppm STEV; 21 mg/m3 STEV	Not established	Not established
	TWAs	1 ppm TWA	10 ppm TWA	10 ppm TWAEV; 14 mg/m3 TWAEV	Not established	Not established
	Ceilings	Not established	Not established	Not established	10 ppm Ceiling (10 min); 15 mg/m3 Ceiling (10 min)	20 ppm Ceiling

Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene STEV = Short Term Exposure Value

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

TWAEV = Time-Weighted Average Exposure Value

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Colorless gas with rotten egg smell.
Color	Colorless	Odor	Rotten egg smell.
Odor Threshold	0.6 to 1 ppm		
General Properties			
Boiling Point	-78.4 C(-109.12 F)	Melting Point	Data lacking
Decomposition Temperature	Data lacking	pH	Not relevant
Specific Gravity/Relative Density	Data lacking	Water Solubility	87.8 % @ 20 C(68 F)
Viscosity	Not relevant		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	1.35 Air=1
Evaporation Rate	Data lacking		
Flammability			
Flash Point	-60 C(-76 F)	UEL	46 %
LEL	4.3 %	Autoignition	260 C(500 F)
Flammability (solid, gas)	Not flammable.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excess heat, sparks, open flame.

Incompatible materials

- Oxidizing materials, rubber, lead, silver, alkali metals, mercury, brass and copper. This weakly acidic material will react with alkaline materials to form carbonates and bicarbonates.

Hazardous decomposition products

- Sulfur Oxides.

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Carbon dioxide (50.0001% TO 85.7499%)	124-38-9	**Acute Toxicity:** Inhalation-Rat LC50 • 470000 ppm 30 Minute(s); **Reproductive:** Inhalation-Rat TCLo • 6 pph 24 Hour(s)(10D preg); *Reproductive Effects:Specific Developmental Abnormalities*:**Musculoskeletal system**; *Reproductive Effects:Specific Developmental Abnormalities*:**Cardiovascular (circulatory) system**; *Reproductive Effects:Specific Developmental Abnormalities*:**Respiratory system**
Hydrogen sulfide (14.2501% TO 49.9999%)	7783-06-4	**Acute Toxicity:** Inhalation-Rat LC50 • 700 mg/m³ 4 Hour(s); **Irritation:** Eye-Human • 0.000125 ppm 5 Hour(s); **Reproductive:** Inhalation-Rat TCLo • 10 mg/m³ (48D pre/1-22D preg); *Reproductive Effects:Effects on Fertility*:**Pre-implantation mortality**; *Reproductive Effects:Effects on Fertility*:**Post-implantation mortality**; *Reproductive Effects:Specific Developmental Abnormalities*:**Urogenital system**

GHS Properties	Classification
Acute toxicity	**OSHA HCS 2012** • Acute Toxicity - Inhalation 3
Aspiration Hazard	**OSHA HCS 2012** • Classification criteria not met
Carcinogenicity	**OSHA HCS 2012** • Classification criteria not met
Germ Cell Mutagenicity	**OSHA HCS 2012** • Classification criteria not met
Skin corrosion/Irritation	**OSHA HCS 2012** • Classification criteria not met
Skin sensitization	**OSHA HCS 2012** • Classification criteria not met
STOT-RE	**OSHA HCS 2012** • Classification criteria not met
STOT-SE	**OSHA HCS 2012** • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
Toxicity for Reproduction	**OSHA HCS 2012** • Classification criteria not met
Respiratory sensitization	**OSHA HCS 2012** • Classification criteria not met
Serious eye damage/Irritation	**OSHA HCS 2012** • Classification criteria not met

Potential Health Effects

Inhalation

Acute (Immediate)
- Toxic if inhaled. May cause respiratory irritation. Inhalation of carbon dioxide can increase respiration and heart rate.

Chronic (Delayed)
- No data available

Skin

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- No data available

Eye

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- No data available

Ingestion

Acute (Immediate)
- Ingestion is not anticipated to be a likely route of exposure to this product.

Chronic (Delayed)
- No data available

Key to abbreviations

LC = Lethal Concentration

TC = Toxic Concentration

Section 12 - Ecological Information

Toxicity

- Material data lacking.

Persistence and degradability

- Material data lacking.

Bioaccumulative potential

- Material data lacking.

Mobility in Soil

- Material data lacking.

Results of PBT and vPvB assessment

- No PBT and vPvB assessment has been conducted.

Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1953	Compressed gases, toxic, flammable, n.o.s (Hydrogen Sulfide, Carbon Dioxide)	2.3	NDA	NDA
TDG	UN1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S. (Hydrogen Sulfide, Carbon Dioxide)	2.3	NDA	NDA
IMO/IMDG	UN1953	COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S. (Hydrogen Sulfide, Carbon Dioxide)	2.3	NDA	NDA
IATA/ICAO	UN1013	Compressed gases, toxic, flammable, n.o.s (Hydrogen Sulfide, Carbon Dioxide)	2.3	NDA	NDA

Special precautions for user

- Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

Other information

DOT • According to Appendix A to 49 CFR 172.101 Hydrogen sulfide H2S has a reportable quantity of 100 lbs (45.4 kg)

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute, Fire, Pressure(Sudden Release of)

State Right To Know				
Component	**CAS**	**MA**	**NJ**	**PA**
Carbon dioxide	124-38-9	Yes	Yes	Yes
Hydrogen sulfide	7783-06-4	Yes	Yes	Yes

Inventory				
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**TSCA**
Carbon dioxide	124-38-9	Yes	No	Yes
Hydrogen sulfide	7783-06-4	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Hydrogen sulfide	7783-06-4	A, B1, D1A, D2B
• Carbon dioxide	124-38-9	A; Uncontrolled product according to WHMIS classification criteria (solid)

Canada - WHMIS - Ingredient Disclosure List

• Hydrogen sulfide	7783-06-4	1 %
• Carbon dioxide	124-38-9	1 %

Environment

Canada - CEPA - Priority Substances List

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Hydrogen sulfide	7783-06-4	1500 lb TQ
• Carbon dioxide	124-38-9	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Hydrogen sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Hydrogen sulfide	7783-06-4	100 lb EPCRA RQ
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Hydrogen sulfide	7783-06-4	500 lb TPQ
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Hydrogen sulfide	7783-06-4	1.0 % de minimis concentration
• Carbon dioxide	124-38-9	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261

• Hydrogen sulfide	7783-06-4	waste number U135
• Carbon dioxide	124-38-9	Not Listed

U.S. - RCRA (Resource Conservation & Recovery Act) - U Series Wastes - Acutely Toxic Wastes & Other Hazardous Characteristics

• Hydrogen sulfide	7783-06-4	waste number U135
• Carbon dioxide	124-38-9	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Hydrogen sulfide	7783-06-4	Not Listed

• Carbon dioxide	124-38-9	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Hydrogen sulfide	7783-06-4	
• Carbon dioxide	124-38-9	Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Hydrogen sulfide	7783-06-4	Not Listed
• Carbon dioxide	124-38-9	Not Listed

Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Last Revision Date
- 17/October/2014

Preparation Date
- 17/October/2014

Disclaimer/Statement of Liability
- To the best of Air Liquide's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.

Key to abbreviations

NDA = No Data Available