

Safety Data Sheet



Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

- Product Name** ● **0.0015–23.5% Oxygen; 0.0005–1.0% Carbon Monoxide; 0.001–0.025% Hydrogen Sulfide; 0–1% Isobutane; Nitrogen Gas balance**
- Product Code** ● MSDS No. 50200

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

- Relevant identified use(s)** ● Calibration of industrial gas devices

1.3 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
- Telephone (Technical)** ● 713-896-2896
- Telephone (Technical)** ● 800-819-1704

1.4 Emergency telephone number

- Manufacturer** ● 800-424-9300 - CHEMTREC
- Manufacturer** ● +1 703-527-3887 - Outside United States

Section 2: Hazards Identification

EU/EEC

According to EU Directive 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

- CLP** ● Compressed Gas - H280
Reproductive Toxicity 1A - H360D
Specific Target Organ Toxicity Repeated Exposure 2 - H373
- DSD/DPD** ● Harmful (Xn)
Substances Toxic To Reproduction - Category 1
R20, R61

2.2 Label Elements

- CLP**
- DANGER**



- Hazard statements**
- H280 - Contains gas under pressure; may explode if heated
 - H360D - May damage the unborn child.
 - H373 - May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

- Prevention**
- P201 - Obtain special instructions before use.
 - P202 - Do not handle until all safety precautions have been read and understood.
 - P220 - Keep/Store away from clothing and other combustible materials.
 - P260 - Do not breathe dust, fume, gas, mist, vapours and/or spray.
 - P281 - Use personal protective equipment as required.
 - P285 - In case of inadequate ventilation wear respiratory protection.
- Response**
- P370+P376 - In case of fire: Stop leak if safe to do so.
 - P309+P311 - IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
 - P308+P313 - IF exposed or concerned: Get medical advice/attention.
- Storage/Disposal**
- P410+P403 - Protect from sunlight. Store in a well-ventilated place.
 - P405 - Store locked up.
 - P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD



- Risk phrases**
- R20 - Harmful by inhalation.
 - R61 - May cause harm to the unborn child.
- Safety phrases**
- S9 - Keep container in a well ventilated place
 - S17 - Keep away from combustible material.
 - S36 - Wear suitable protective clothing.
 - S53 - Avoid exposure - obtain special instructions before use.

2.3 Other Hazards

- CLP**
- According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.
- DSD/DPD**
- According to European Directive 1999/45/EC this preparation is considered dangerous.

UN GHS

According to Third Revised Edition

2.1 Classification of the substance or mixture

- UN GHS**
- Compressed Gas - H280
 - Reproductive Toxicity 1A - H360

2.2 Label elements

UN GHS

DANGER



- Hazard statements**
- H280 - Contains gas under pressure; may explode if heated
 - H360 - May damage fertility or the unborn child.

Precautionary statements

- Prevention**
- P201 - Obtain special instructions before use.
 - P202 - Do not handle until all safety precautions have been read and understood.
 - P220 - Keep/Store away from clothing and other combustible materials.
 - P281 - Use personal protective equipment as required.

- Response**
- P370+P376 - In case of fire: Stop leak if safe to do so.
 - P308+P313 - IF exposed or concerned: Get medical advice/attention.

- Storage/Disposal**
- P410+P403 - Protect from sunlight. Store in a well-ventilated place.
 - P405 - Store locked up.
 - P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

UN GHS

- According to the Globally Harmonized System for Classification and Labeling (GHS) this product is considered hazardous.
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United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

- OSHA HCS 1994
- Compressed Gas

2.2 Label elements

- OSHA HCS 1994
- Not required

2.3 Other hazards

- OSHA HCS 1994
- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.
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Canada

According to WHMIS

2.1 Classification of the substance or mixture

- WHMIS
- Compressed Gas - A
 - Very Toxic - D1A
 - Other Toxic Effects - D2A

2.2 Label elements

WHMIS



- Compressed Gas - A
- Very Toxic - D1A
- Other Toxic Effects - D2A

2.3 Other hazards

WHMIS

- In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).
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2.4 Other information

- Note: This SDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 3 (Composition/Information on Ingredients). All classifications provided are based on the highest end of the range provided for each component. Refer to the product label for information on the actual composition of the product.
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Section 3 - Composition/Information on Ingredients

3.1 Substances

- Material does not meet the criteria of a substance according to United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS)
Material does not meet the criteria of a substance in accordance with Regulation (EC) No 1272/2008.

3.2 Mixtures

Hazardous Components					
Chemical Name	Identifiers	%(weight)	LD50/LC50	Classifications According to Regulation/Directive	Comments
Nitrogen	CAS:7727-37-9 UN:UN1066 EINECS:231-783-9	74.475% TO 99.997%	NDA	UN GHS: Press. Gas - Comp EU DSD/DPD: Not Classified EU CLP: Self Classified - Press. Gas - Comp, H280	NDA
Oxygen	CAS:7782-44-7 EC Number:231-956-9 UN:UN1072	0.0015% TO 23.5%	NDA	UN GHS: Ox. Gas 1 EU DSD/DPD: Annex I - O; R8 EU CLP: Annex VI - Ox. Gas 1, H270; Press. Gas - Comp, H280	NDA
Carbon monoxide	CAS:630-08-0 EC Number:211-128-3 UN:UN1016	0.0005% TO 1%	Inhalation-Rat LC50 • 1807 ppm 4 Hour(s)	UN GHS: Acute Tox. 3 (Inhalation); Flam. Gas 1; Repr. 1A; Press. Gas - Comp; EU DSD/DPD: Annex I - F+; R12 T; R23 R48/23 Repr.Cat.1; R61 EU CLP: Annex VI - Flam. Gas 1, H220; Press. Gas - Comp; Acute Tox. 3*, H331; Repr. 1A, H360D; STOT RE 1, H372;	NDA
Isobutane	CAS:75-28-5 EC Number:200-857-2 UN:UN1969	0% TO 1%	Inhalation-Rat LC50 • 658000 mg/m ³ 4 Hour(s)	UN GHS: Flam. Gas 1; Press. Gas - Comp EU DSD/DPD: Annex I - F+; R12 EU CLP: Annex VI - Flam. Gas 1, H220; Press. Gas - Comp;	NDA
Hydrogen sulfide	CAS:7783-06-4 EC Number:231-977-3 UN:UN1053	0.001% TO 0.025%	Inhalation-Rat LC50 • 444 ppm	UN GHS: Acute Tox. 2 (Inhalation); Flam. Gas 1; Press. Gas - Comp EU DSD/DPD: Annex I - F+; R12 T+; R26 N; R50 EU CLP: Annex VI - Flam. Gas 1, H220; Press. Gas - Comp; Acute Tox 2*, H300; Aquatic Acute 1, H400;	NDA

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

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

Skin

- In case of contact, immediately flush with plenty of water for at least 15 minutes. Take off contaminated clothing. If irritation develops and persists, get medical attention.

Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses,

if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Ingestion

- Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician

- Treat symptoms and eliminate over-exposure. Hyperbaric oxygen is the most efficient antidote to Carbon Monoxide poisoning, the optimum range being 2-2.5 atm. A special mask, or, preferably, a compression chamber to utilize oxygen at these pressures is required. Avoid administering stimulant drugs. Be observant for initial signs of pulmonary edema in the event of severe inhalation over-exposures.

4.4 Other information

- RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE 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 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media ● Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

Unsuitable Extinguishing Media ● No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards ● This gas mixture contains toxic gases, Hydrogen Sulfide and Carbon Monoxide, and presents a health hazard to firefighters. This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

Hazardous Combustion Products ● No data available

5.3 Advice for firefighters

- Structural firefighters' protective clothing will only provide limited protection. Wear positive pressure self-contained breathing apparatus (SCBA).

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions ● Wear appropriate personal protective equipment. See section 8 for more information.

Emergency Procedures ● Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of over-exposure to Hydrogen Sulfide and Carbon Monoxide, the toxic components of this gas mixture, and other safety hazards related to the remaining components of this gas mixture, than a similar release from a larger cylinder. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

6.2 Environmental precautions

- Avoid release to the environment.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures

- Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for concentrations of component gases. Concentrations of component gases must be below any exposure limits listed in Section 8 and Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

6.4 Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

- Use good safety and industrial hygiene practices. Use only with adequate ventilation. 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. 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.

7.2 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 52°C (125°F). Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C (70°F)). Cylinders should be firmly secured to prevent falling or being knocked-over. Protect cylinders against physical damage. Store locked up.

7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	Canada Ontario	Canada Quebec	China	Germany DFG
Isobutane (75-28-5)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	800 ppm TWA (listed under Aliphatic hydrocarbon gases)	Not established	Not established	Not established
	Ceilings	Not established	Not established	Not established	Not established	4000 ppm Peak (listed under Butane); 9600 mg/m3 Peak (listed under Butane)
	MAKs	Not established	Not established	Not established	Not established	1000 ppm TWA MAK; 2400 mg/m3 TWA MAK
	Ceilings	Not established	Not established	Not established	20 mg/m3 Ceiling [MAC] (high altitude area, 2000-3000m); 15 mg/m3 Ceiling	60 ppm Peak; 70 mg/m3 Peak

Carbon monoxide (630-08-0)					[MAC] (high altitude area, >3000m)	
	STELs	Not established	100 ppm STEL	200 ppm STEV; 230 mg/m3 STEV	30 mg/m3 STEL (not in high altitude area)	Not established
	TWAs	25 ppm TWA	25 ppm TWA	35 ppm TWAEV; 40 mg/m3 TWAEV	20 mg/m3 TWA (not in high altitude area)	Not established
	MAKs	Not established	Not established	Not established	Not established	30 ppm TWA MAK; 35 mg/m3 TWA MAK
Hydrogen sulfide (7783-06-4)	Ceilings	Not established	Not established	Not established	10 mg/m3 Ceiling [MAC]	10 ppm Peak; 14.2 mg/m3 Peak
	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
	MAKs	Not established	Not established	Not established	Not established	5 ppm TWA MAK; 7.1 mg/m3 TWA MAK

Exposure Limits/Guidelines (Con't.)

	Result	Germany TRGS	NIOSH	OSHA	Singapore
Isobutane (75-28-5)	TWAs	1000 ppm TWA AGW (exposure factor 4); 2400 mg/m3 TWA AGW (exposure factor 4)	800 ppm TWA; 1900 mg/m3 TWA	Not established	Not established
Carbon monoxide (630-08-0)	TWAs	30 ppm TWA AGW (The risk of damage to the embryo or fetus cannot be excluded even when AGW and BGW values are observed, exposure factor 1); 35 mg/m3 TWA AGW (The risk of damage to the embryo or fetus cannot be excluded even when AGW and BGW values are observed, exposure factor 1)	35 ppm TWA; 40 mg/m3 TWA	50 ppm TWA; 55 mg/m3 TWA	25 ppm PEL; 29 mg/m3 PEL
	Ceilings	Not established	200 ppm Ceiling; 229 mg/m3 Ceiling	Not established	Not established
Hydrogen sulfide (7783-06-4)	STELs	Not established	Not established	Not established	15 ppm STEL; 21 mg/m3 STEL
	TWAs	5 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2); 7.1 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure	Not established	Not established	10 ppm PEL; 14 mg/m3 PEL

		factor 2)		
	Ceilings	Not established	10 ppm Ceiling (10 min); 15 mg/m3 Ceiling (10 min)	20 ppm Ceiling
				Not established

8.2 Exposure controls

Engineering Measures/Controls

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of component gases.

Personal Protective Equipment

Pictograms



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 protective gloves leather gloves when handling cylinders; chemically resistant gloves when using this gas mixture and clothing .

Environmental Exposure Controls

- 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

MSHA = Mine Safety and Health Administration

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

PEL = Permissible Exposure Level determined by the Occupational Safety and Health Administration (OSHA)

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

STEV = Short Term Exposure Value

TWAEV = Time-Weighted Average Exposure Value

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

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Gas mixture, colorless gas, which has a rotten egg-like odor, due to the presence of Hydrogen Sulfide.
Color	Colorless	Odor	Rotten-egg
Taste	No data available	Particulate Type	Not relevant
Particulate Size	Not relevant	Aerosol Type	Not relevant
Odor Threshold	0.13 ppm Hydrogen sulfide	Physical and Chemical Properties	No data available
General Properties			
Boiling Point	-320.4 F(-195.7778 C) Nitrogen	Melting Point	-345.8 F(-209.8889 C) Nitrogen
Decomposition Temperature	No data available	Heat of Decomposition	No data available
pH	No data available	Specific Gravity/Relative Density	No data available

Density	0.072 lb(s)/ft ³ Nitrogen	Bulk Density	No data available
Water Solubility	0.023 (vol/vol) Nitrogen	Solvent Solubility	No data available
Viscosity	Not relevant	Explosive Properties	No data available
Oxidizing Properties:	Not an oxidizing gas.		
Volatility			
Vapor Pressure	Not relevant	Vapor Density	0.967 Air=1 Nitrogen
Evaporation Rate	Not relevant	VOC (Wt.)	No data available
VOC (Vol.)	No data available	Volatiles (Wt.)	No data available
Volatiles (Vol.)	No data available		
Flammability			
Flash Point	Not relevant	UEL	Not relevant
LEL	Not relevant	Autoignition	Not relevant
Self-Accelerating Decomposition Temperature (SADT)	No data available	Heat of Combustion (ΔH_c)	No data available
Burning Time	No data available	Flame Duration	No data available
Flame Height	No data available	Flame Extension	No data available
Ignition Distance	No data available	Flammability (solid, gas)	No data available
Environmental			
Half-Life	No data available	Octanol/Water Partition coefficient	No data available
Coefficient of water/oil distribution	Not relevant	Bioaccumulation Factor	No data available
Bioconcentration Factor	No data available	Biochemical Oxygen Demand BOD/BOD ₅	No data available
Chemical Oxygen Demand	No data available	Persistence	No data available
Degradation	No data available		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Excess heat. Incompatible materials.

10.5 Incompatible materials

- Oxidizers, Titanium, Lithium.

10.6 Hazardous decomposition products

- Sulfur oxide.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Component Name	CAS	Data
Oxygen (0.0015% TO 23.5%)	7782-44-7	Acute Toxicity: ihl-rat TCLo:95 pph/7D-C; Reproductive: ihl-rat TCLo:10 pph/9H (22D preg)
Carbon monoxide (0.0005% TO 1%)	630-08-0	Acute Toxicity: ihl-rat LC50:1807 ppm/4H; Reproductive: ihl-rat TCLo:103 mg/m3 (1-22D preg)
Isobutane (0% TO 1%)	75-28-5	Acute Toxicity: ihl-rat LC50:658000 mg/m3/4H
Hydrogen sulfide (0.001% TO 0.025%)	7783-06-4	Acute Toxicity: ihl-rat LC50:444 ppm; skn-rbt TDL0:1000 mg/m3/2H; Irritation: eye-hmn 0.000125 ppm/5H; Reproductive: ihl-rat TCLo:10 mg/m3 (48D pre/1-22D preg)

GHS Properties	Classification
Acute toxicity	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Aspiration Hazard	EU/CLP • Not relevant UN GHS • Not relevant
Carcinogenicity	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Germ Cell Mutagenicity	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Skin corrosion/Irritation	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Skin sensitization	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
STOT-RE	EU/CLP • Specific Target Organ Toxicity Repeated Exposure 2 UN GHS • Classification criteria not met
STOT-SE	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Toxicity for Reproduction	EU/CLP • Toxic to Reproduction 1A UN GHS • Toxic to Reproduction 1A
Respiratory sensitization	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met
Serious eye damage/Irritation	EU/CLP • Classification criteria not met UN GHS • Classification criteria not met

Route(s) of entry/exposure • Inhalation, Skin, Eye, Ingestion

Potential Health Effects

Inhalation

Acute (Immediate)

- A potential health hazard associated with this gas mixture is the inhalation of Hydrogen Sulfide, a component of this gas mixture. Such over-exposures may occur if this gas mixture is used in a confined space or other poorly-ventilated area. Over-

exposures to Hydrogen Sulfide can cause dizziness, headache, nausea, respiratory arrest, coma, or unconsciousness. Continuous inhalation of low concentrations of Hydrogen Sulfide may cause olfactory fatigue, so that the odor is no longer an effective warning of the presence of this gas. Inhalation over-exposures to atmospheres containing more than the Threshold Limit Value of Carbon Monoxide (25 ppm), another component of this gas mixture, can result in serious health consequences. Carbon Monoxide is classified as a chemical asphyxiant, producing a toxic action by combining with the hemoglobin of the blood and replacing the available oxygen. Through this replacement, the body is deprived of the required oxygen, and asphyxiation occurs. Since the affinity of Carbon Monoxide for hemoglobin is about 200-300 times that of oxygen, only a small amount of Carbon Monoxide will cause a toxic reaction to occur. Carbon Monoxide exposures in excess of 50 ppm will produce symptoms of poisoning if breathed for a sufficiently long time. If this gas mixture is released in a small, poorly ventilated area (i.e. an enclosed or confined space), symptoms which may develop include the following: bright red lips and fingernails, headache progressing to heart palpitations, staggering, confusion, nausea, dizziness and unconsciousness with higher concentration exposures. For exposures greater than 2500 ppm there is potential for collapse and death before warning symptoms are experienced.

Chronic (Delayed)

- Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system.

Skin

Acute (Immediate)

- Hydrogen Sulfide, a component of this gas mixture, may be irritating to the skin.

Chronic (Delayed)

- No data available

Eye

Acute (Immediate)

- May cause mild irritation. Inflammation and irritation of the eyes can occur at very low airborne concentration of Hydrogen Sulfide (less than 10 ppm). Exposure over several hours may result in “gas eyes” or “sore eyes” with symptoms of scratchiness, irritation, tearing and burning. Above 50 ppm of Hydrogen Sulfide, there is an intense tearing, blurring of vision, and pain when looking at light. Over-exposed individuals may see rings around bright lights. Most symptoms disappear when exposure ceases. However, in serious cases, the eye can be permanently damaged.

Chronic (Delayed)

- No data available

Ingestion

Acute (Immediate)

- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)

- No data available

Mutagenic Effects

- The components of this gas mixture are not reported to cause mutagenic effects in humans.

Carcinogenic Effects

- The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

Reproductive Effects

- The Carbon Monoxide component of this gas mixture which exists up to 1%, can cause teratogenic effects in humans. Severe exposure to Carbon Monoxide during pregnancy has caused adverse effects and the death of the fetus. In general, maternal symptoms are an indicator of the potential risk to the fetus since Carbon Monoxide is toxic to the mother before it is toxic to the fetus.

Section 12 - Ecological Information

12.1 Toxicity

0.0015–23.5% Oxygen; 0.0005–1.0% Carbon Monoxide; 0.001–0.025% Hydrogen Sulfide; 0–1% Isobutane; Nitrogen Gas balance					
Dosage	Species	Duration	Results	Exposure Conditions	Comments

0.0071 to 0.55 mg/L	Fish: Fathead minnow	96 Day(s)	LC50	NDA	Hydrogen Sulfide component
0.009 to 0.014 mg/L	Fish: Bluegill	96 Hour(s)	LC50	NDA	Hydrogen sulfide component

12.2 Persistence and degradability

- Material data lacking.

12.3 Bioaccumulative potential

- Material data lacking.

12.4 Mobility in Soil

- Material data lacking.

12.5 Results of PBT and vPvB assessment

- PBT and vPvB assessment has not been conducted.

12.6 Other adverse effects

- No evidence is currently available on this gas mixture's effects on plant, animal or aquatic life. Hydrogen Sulfide and Carbon Monoxide, components of this gas mixture, can be deadly to exposed animal life, producing symptoms similar to those experienced by humans. This gas mixture may also be harmful to plant life. The presence of more than a trace of the Carbon Monoxide component of this gas mixture is a hazard to fish.

Section 13 - Disposal Considerations

13.1 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

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1956	Compressed gas, n.o.s (Oxygen, Nitrogen)	2.2	NDA	NDA
TDG	UN1956	COMPRESSED GAS, N.O.S. (Oxygen, Nitrogen)	2.2	NDA	NDA
IMO/IMDG	UN1956	COMPRESSED GAS, N.O.S. (OXYGEN, NITROGEN)	2.2	NDA	NDA
IATA/ICAO	UN1956	Compressed Gas, n.o.s. (Oxygen, Nitrogen)	2.2	NDA	NDA

14.6 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.

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

- This product is provided only in non-bulk containers.

Section 15 - Regulatory Information

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

State Right To Know				
Component	CAS	MA	NJ	PA
Nitrogen	7727-37-9	Yes	Yes	Yes
Oxygen	7782-44-7	Yes	Yes	Yes
Carbon monoxide	630-08-0	Yes	Yes	Yes
Isobutane	75-28-5	Yes	Yes	Yes
Hydrogen sulfide	7783-06-4	Yes	Yes	Yes

Inventory						
Component	CAS	Canada DSL	Canada NDSL	China	EU EINECS	EU ELNICS
Nitrogen	7727-37-9	Yes	No	Yes	Yes	No
Oxygen	7782-44-7	Yes	No	Yes	Yes	No
Carbon monoxide	630-08-0	Yes	No	Yes	Yes	No
Isobutane	75-28-5	Yes	No	Yes	Yes	No
Hydrogen sulfide	7783-06-4	Yes	No	Yes	Yes	No

Inventory (Con't.)				
Component	CAS	Japan ENCS	Korea KECL	TSCA
Nitrogen	7727-37-9	No	Yes	Yes
Oxygen	7782-44-7	No	Yes	Yes
Carbon monoxide	630-08-0	Yes	Yes	Yes
Isobutane	75-28-5	Yes	Yes	Yes
Hydrogen sulfide	7783-06-4	Yes	Yes	Yes

Australia

Labor

Australia - Work Health and Safety Regulations - Hazardous Substances Requiring Health Monitoring

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

Australia - High Volume Industrial Chemicals List

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Not Listed
• Carbon monoxide	630-08-0	0.0005% TO 1%	Not Listed
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Australia - List of Designated Hazardous Substances - Classification

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	F+, T+, N R12, R26, R50
• Carbon monoxide	630-08-0	0.0005% TO 1%	F+, T Repr.Cat.1 R12, R61, R23, R48/23
• Oxygen	7782-44-7	0.0015% TO 23.5%	O R8
• Isobutane	75-28-5	0% TO 1%	F+ Carc.Cat.1, Muta.Cat.2 R12, R45, R46 (containing >=0.1% Butadiene)
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Environment

Australia - National Pollutant Inventory (NPI) Substance List

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	10 tonne/yr Threshold category 1
• Carbon monoxide	630-08-0	0.0005% TO 1%	10 tonne/yr Threshold category 1; 400 tonne/yr Threshold category 2a; 1 tonne/h Threshold category 2a; 2000 tonne/yr Threshold category 2b; 60000 MWH Threshold category 2b; 20 MW Threshold category 2b
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	15 tonne/yr Threshold category 3 (total)

Australia - Ozone Protection Act - Scheduled Substances

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Not Listed
• Carbon monoxide	630-08-0	0.0005% TO 1%	Not Listed
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Australia - Priority Existing Chemical Program

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Not Listed
• Carbon monoxide	630-08-0	0.0005% TO 1%	Not Listed
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	A, B1, D1A, D2B
• Carbon monoxide	630-08-0	0.0005% TO 1%	A, B1, D1A, D2A
• Oxygen	7782-44-7	0.0015% TO 23.5%	A, C
• Isobutane	75-28-5	0% TO 1%	A, B1 (listed under Methyl-2 propane)
• Nitrogen	7727-37-9	74.475% TO 99.997%	A

Canada - WHMIS - Ingredient Disclosure List

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	1 %
• Carbon monoxide	630-08-0	0.0005% TO 1%	0.1 %
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Not Listed
• Carbon monoxide	630-08-0	0.0005% TO 1%	Not Listed
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

Europe

Other

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	F+; R12 T+; R26 N; R50
• Carbon monoxide	630-08-0	0.0005% TO 1%	F+; R12 T; R23-48/23 Repr.Cat.1; R61
• Oxygen	7782-44-7	0.0015% TO 23.5%	O; R8
• Isobutane	75-28-5	0% TO 1%	F+; R12
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Not Listed
• Carbon monoxide	630-08-0	0.0005% TO 1%	Not Listed
• Oxygen	7782-44-7	0.0015% TO 23.5%	Not Listed
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	F+ T+ N R:12-26-50 S:(1/2)-9-16-36-38-45-61
• Carbon monoxide	630-08-0	0.0005% TO 1%	F+ T R:61-12-23-48/23 S:53-45

- Oxygen 7782-44-7 0.0015% TO 23.5% O R:8 S:(2)-17
- Isobutane 75-28-5 0% TO 1% F+ R:12 S:(2)-9-16
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% E
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% C
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% S:(1/2)-9-16-36-38-45-61
- Carbon monoxide 630-08-0 0.0005% TO 1% S:53-45
- Oxygen 7782-44-7 0.0015% TO 23.5% S:(2)-17
- Isobutane 75-28-5 0% TO 1% S:(2)-9-16
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

Mexico**Other****Mexico - Hazard Classifications**

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Hazard Class = 2.3 (2.1) UN1053
- Carbon monoxide 630-08-0 0.0005% TO 1% Hazard Class = 2.3 (2.1) UN1016
- Oxygen 7782-44-7 0.0015% TO 23.5% Hazard Class = 2.2 (5.1) UN1072; Hazard Class = 2.2 (5.1) UN1073
- Isobutane 75-28-5 0% TO 1% Hazard Class = 2.1 UN1969
- Nitrogen 7727-37-9 74.475% TO 99.997% Hazard Class = 2.2 UN1066; Hazard Class = 2.2 UN1977

Mexico - Regulated Substances

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% UN1053
- Carbon monoxide 630-08-0 0.0005% TO 1% UN1016
- Oxygen 7782-44-7 0.0015% TO 23.5% UN1072; UN1073
- Isobutane 75-28-5 0% TO 1% UN1969
- Nitrogen 7727-37-9 74.475% TO 99.997% UN1066; UN1977

United States**Labor****U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% 1500 lb TQ
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed

- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

Environment

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% 100 lb final RQ; 45.4 kg final RQ
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% 100 lb EPCRA RQ
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% 500 lb TPQ
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% 1.0 % de minimis concentration
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% waste number U135
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

United States - California

Environment

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% developmental toxicity, initial date 7/1/89
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed

- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

United States - Pennsylvania

Labor

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025%
- Carbon monoxide 630-08-0 0.0005% TO 1%
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

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

- Hydrogen sulfide 7783-06-4 0.001% TO 0.025% Not Listed
- Carbon monoxide 630-08-0 0.0005% TO 1% Not Listed
- Oxygen 7782-44-7 0.0015% TO 23.5% Not Listed
- Isobutane 75-28-5 0% TO 1% Not Listed
- Nitrogen 7727-37-9 74.475% TO 99.997% Not Listed

United States - Rhode Island

Labor

U.S. - Rhode Island - Hazardous Substance List

• Hydrogen sulfide	7783-06-4	0.001% TO 0.025%	Toxic; Flammable
• Carbon monoxide	630-08-0	0.0005% TO 1%	Toxic
• Oxygen	7782-44-7	0.0015% TO 23.5%	Flammable
• Isobutane	75-28-5	0% TO 1%	Not Listed
• Nitrogen	7727-37-9	74.475% TO 99.997%	Flammable

15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Relevant Phrases (code & full text)

- H220 - Extremely flammable gas
- H270 - May cause or intensify fire; oxidizer
- H300 - Fatal if swallowed
- H331 - Toxic if inhaled
- H372 - Causes damage to organs through prolonged or repeated exposure.
- H400 - Very toxic to aquatic life
- R8 - Contact with combustible material may cause fire.
- R12 - Extremely flammable.
- R23 - Toxic by inhalation.
- R26 - Very toxic by inhalation.
- R48/23 - Toxic: danger of serious damage to health by prolonged exposure through inhalation.
- R50 - Very toxic to aquatic organisms.

Last Revision Date

- 10/August/2012

Preparation Date

- 10/August/2012

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