

Material Safety Data Sheet



Flammable Gas Mixture: 1 Butene / 1 Pentene / 1,3 Butadiene / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N Butane / N Pentane / Nitrogen / Oxygen / Propane / Propylene / Trans-2-Butene

Section 1. Chemical product and company identification

- Product name** : Flammable Gas Mixture: 1 Butene / 1 Pentene / 1,3 Butadiene / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N Butane / N Pentane / Nitrogen / Oxygen / Propane / Propylene / Trans-2-Butene
- 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.
- MSDS #** : 009266
- Date of Preparation/Revision** : **8/19/2009.**
- In case of emergency** : 1-866-734-3438

Section 2. Hazards identification

- Physical state** : Gas.
DANGER!
FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
CANCER HAZARD - CONTAINS MATERIAL WHICH CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.
Keep away from heat, sparks and flame. Do not puncture or incinerate container. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container closed.
Contact with rapidly expanding gases can cause frostbite.
- Routes of entry** : Inhalation
- Potential acute health effects**
- Eyes** : Contact with rapidly expanding gas may cause burns or frostbite.
- Skin** : Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Acts as a simple asphyxiant.
- Ingestion** : Ingestion is not a normal route of exposure for gases
- Potential chronic health effects** : **CARCINOGENIC EFFECTS:** Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Ethene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [1-Propene]. Classified 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by NIOSH [1,3-Butadiene]. Classified A2 (Suspected for humans.) by ACGIH [1,3-Butadiene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH [1-Propene, 2-methyl-].
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
- Medical conditions aggravated by over-exposure** : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.
- See toxicological information (section 11)**

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Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Nitrogen	7727-37-9	92.2	Oxygen Depletion [Asphyxiant]
Carbon Dioxide	124-38-9	0.5	ACGIH TLV (United States, 1/2009). STEL: 54000 mg/m ³ 15 minute(s). STEL: 30000 ppm 15 minute(s). TWA: 9000 mg/m ³ 8 hour(s). TWA: 5000 ppm 8 hour(s). NIOSH REL (United States, 6/2008). STEL: 54000 mg/m ³ 15 minute(s). STEL: 30000 ppm 15 minute(s). TWA: 9000 mg/m ³ 10 hour(s). TWA: 5000 ppm 10 hour(s). OSHA PEL (United States, 11/2006). TWA: 9000 mg/m ³ 8 hour(s). TWA: 5000 ppm 8 hour(s). OSHA PEL 1989 (United States, 3/1989). STEL: 54000 mg/m ³ 15 minute(s). STEL: 30000 ppm 15 minute(s). TWA: 18000 mg/m ³ 8 hour(s). TWA: 10000 ppm 8 hour(s).
Carbon Monoxide	630-08-0	0.5	ACGIH TLV (United States, 1/2009). TWA: 29 mg/m ³ 8 hour(s). TWA: 25 ppm 8 hour(s). NIOSH REL (United States, 6/2008). CEIL: 229 mg/m ³ CEIL: 200 ppm TWA: 40 mg/m ³ 10 hour(s). TWA: 35 ppm 10 hour(s). OSHA PEL (United States, 11/2006). TWA: 55 mg/m ³ 8 hour(s). TWA: 50 ppm 8 hour(s). OSHA PEL 1989 (United States, 3/1989). CEIL: 229 mg/m ³ CEIL: 200 ppm TWA: 40 mg/m ³ 8 hour(s). TWA: 35 ppm 8 hour(s).
Cis-2-Butene	590-18-1	0.5	ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).
Ethane	74-84-0	0.5	ACGIH TLV (United States, 1/2009). TWA: 1000 ppm 8 hour(s).
Ethylene	74-85-1	0.5	ACGIH TLV (United States, 1/2009). TWA: 200 ppm 8 hour(s).
Hydrogen	1333-74-0	0.5	Oxygen Depletion [Asphyxiant]
Isobutane	75-28-5	0.5	ACGIH TLV (United States, 1/2009). TWA: 1000 ppm 8 hour(s). NIOSH REL (United States, 6/2008). TWA: 1900 mg/m ³ 10 hour(s). TWA: 800 ppm 10 hour(s).
Methane	74-82-8	0.5	ACGIH TLV (United States, 1/2009). TWA: 1000 ppm 8 hour(s).
N-Butane	106-97-8	0.5	ACGIH TLV (United States, 1/2009). TWA: 1000 ppm 8 hour(s). NIOSH REL (United States, 6/2008). TWA: 1900 mg/m ³ 10 hour(s). TWA: 800 ppm 10 hour(s). OSHA PEL 1989 (United States, 3/1989). TWA: 1900 mg/m ³ 8 hour(s). TWA: 800 ppm 8 hour(s).

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Oxygen	7782-44-7	0.5	
Propane	74-98-6	0.5	<p>ACGIH TLV (United States, 1/2009). TWA: 1000 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). TWA: 1800 mg/m³ 10 hour(s). TWA: 1000 ppm 10 hour(s).</p> <p>OSHA PEL (United States, 11/2006). TWA: 1800 mg/m³ 8 hour(s). TWA: 1000 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). TWA: 1800 mg/m³ 8 hour(s). TWA: 1000 ppm 8 hour(s).</p>
Propylene	115-07-1	0.5	<p>ACGIH TLV (United States, 1/2009). TWA: 500 ppm 8 hour(s).</p> <p>ACGIH TLV (United States, 1/2005). TWA: 500 ppm 8 hour(s). Form: All forms</p>
Trans-2-Butene	624-64-6	0.5	<p>ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).</p>
1-Butene	106-98-9	0.2	<p>ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).</p>
1-Pentene	109-67-1	0.2	
1,3-Butadiene	106-99-0	0.2	<p>ACGIH TLV (United States, 1/2009). TWA: 4.4 mg/m³ 8 hour(s). TWA: 2 ppm 8 hour(s).</p> <p>OSHA PEL (United States, 11/2006). STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).</p>
Hydrogen Sulfide	7783-06-4	0.2	<p>ACGIH TLV (United States, 1/2009). STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). CEIL: 15 mg/m³ 10 minute(s). CEIL: 10 ppm 10 minute(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s).</p> <p>OSHA PEL Z2 (United States, 11/2006). AMP: 50 ppm 10 minute(s). CEIL: 20 ppm</p>
Isobutylene	115-11-7	0.2	<p>ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).</p>
N-Hexane	110-54-3	0.1	<p>ACGIH TLV (United States, 1/2009). Absorbed through skin. TWA: 50 ppm 8 hour(s).</p> <p>NIOSH REL (United States, 6/2008). TWA: 180 mg/m³ 10 hour(s). TWA: 50 ppm 10 hour(s).</p> <p>OSHA PEL (United States, 11/2006). TWA: 1800 mg/m³ 8 hour(s). TWA: 500 ppm 8 hour(s).</p> <p>OSHA PEL 1989 (United States, 3/1989). TWA: 180 mg/m³ 8 hour(s). TWA: 50 ppm 8 hour(s).</p>
Isopentane	78-78-4	0.1	<p>ACGIH TLV (United States, 1/2009).</p>

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N-Pentane

109-66-0

0.1

TWA: 600 ppm 8 hour(s).

ACGIH TLV (United States, 1/2009).

TWA: 600 ppm 8 hour(s).

NIOSH REL (United States, 6/2008).

CEIL: 1800 mg/m³ 15 minute(s).

CEIL: 610 ppm 15 minute(s).

TWA: 350 mg/m³ 10 hour(s).

TWA: 120 ppm 10 hour(s).

OSHA PEL (United States, 11/2006).

TWA: 2950 mg/m³ 8 hour(s).

TWA: 1000 ppm 8 hour(s).

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

STEL: 2250 mg/m³ 15 minute(s).

STEL: 750 ppm 15 minute(s).

TWA: 1800 mg/m³ 8 hour(s).

TWA: 600 ppm 8 hour(s).

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. 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** : 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.
- Products of combustion** : Decomposition products may include the following materials: nitrogen oxides
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: oxidizing materials.
- 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. Extremely flammable. In a fire or if heated, a pressure increase will occur and the container may burst or explode. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or 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.

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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. 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. 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. 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.

Product name

Nitrogen
Carbon dioxide

Oxygen Depletion [Asphyxiant]
ACGIH TLV (United States, 1/2009).
STEL: 54000 mg/m³ 15 minute(s).
STEL: 30000 ppm 15 minute(s).
TWA: 9000 mg/m³ 8 hour(s).
TWA: 5000 ppm 8 hour(s).
NIOSH REL (United States, 6/2008).
STEL: 54000 mg/m³ 15 minute(s).
STEL: 30000 ppm 15 minute(s).
TWA: 9000 mg/m³ 10 hour(s).

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	TWA: 5000 ppm 10 hour(s).
	OSHA PEL (United States, 11/2006).
	TWA: 9000 mg/m ³ 8 hour(s).
	TWA: 5000 ppm 8 hour(s).
	OSHA PEL 1989 (United States, 3/1989).
	STEL: 54000 mg/m ³ 15 minute(s).
	STEL: 30000 ppm 15 minute(s).
	TWA: 18000 mg/m ³ 8 hour(s).
	TWA: 10000 ppm 8 hour(s).
Carbon monoxide	ACGIH TLV (United States, 1/2009).
	TWA: 29 mg/m ³ 8 hour(s).
	TWA: 25 ppm 8 hour(s).
	NIOSH REL (United States, 6/2008).
	CEIL: 229 mg/m ³
	CEIL: 200 ppm
	TWA: 40 mg/m ³ 10 hour(s).
	TWA: 35 ppm 10 hour(s).
	OSHA PEL (United States, 11/2006).
	TWA: 55 mg/m ³ 8 hour(s).
	TWA: 50 ppm 8 hour(s).
	OSHA PEL 1989 (United States, 3/1989).
	CEIL: 229 mg/m ³
	CEIL: 200 ppm
	TWA: 40 mg/m ³ 8 hour(s).
	TWA: 35 ppm 8 hour(s).
2-Butene, (2Z)-	ACGIH TLV (United States, 1/2009).
	TWA: 250 ppm 8 hour(s).
Ethane	ACGIH TLV (United States, 1/2009).
	TWA: 1000 ppm 8 hour(s).
Ethene	ACGIH TLV (United States, 1/2009).
	TWA: 200 ppm 8 hour(s).
Hydrogen	Oxygen Depletion [Asphyxiant]
Isobutane	ACGIH TLV (United States, 1/2009).
	TWA: 1000 ppm 8 hour(s).
	NIOSH REL (United States, 6/2008).
	TWA: 1900 mg/m ³ 10 hour(s).
	TWA: 800 ppm 10 hour(s).
Methane	ACGIH TLV (United States, 1/2009).
	TWA: 1000 ppm 8 hour(s).
Butane	ACGIH TLV (United States, 1/2009).
	TWA: 1000 ppm 8 hour(s).
	NIOSH REL (United States, 6/2008).
	TWA: 1900 mg/m ³ 10 hour(s).
	TWA: 800 ppm 10 hour(s).
	OSHA PEL 1989 (United States, 3/1989).
	TWA: 1900 mg/m ³ 8 hour(s).
	TWA: 800 ppm 8 hour(s).
Oxygen	ACGIH TLV (United States, 1/2009).
Propane	TWA: 1000 ppm 8 hour(s).
	NIOSH REL (United States, 6/2008).
	TWA: 1800 mg/m ³ 10 hour(s).
	TWA: 1000 ppm 10 hour(s).
	OSHA PEL (United States, 11/2006).
	TWA: 1800 mg/m ³ 8 hour(s).
	TWA: 1000 ppm 8 hour(s).
	OSHA PEL 1989 (United States, 3/1989).
	TWA: 1800 mg/m ³ 8 hour(s).
	TWA: 1000 ppm 8 hour(s).
1-Propene	ACGIH TLV (United States, 1/2009).
	TWA: 500 ppm 8 hour(s).

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2-Butene, (2E)-	ACGIH TLV (United States, 1/2005). TWA: 500 ppm 8 hour(s). Form: All forms
1-Butene	ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).
1-Pentene	ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).
1,3-Butadiene	ACGIH TLV (United States, 1/2009). TWA: 4.4 mg/m ³ 8 hour(s). TWA: 2 ppm 8 hour(s). OSHA PEL (United States, 11/2006). STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). OSHA PEL 1989 (United States, 3/1989). STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).
Hydrogen sulfide (H2S)	ACGIH TLV (United States, 1/2009). 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). NIOSH REL (United States, 6/2008). 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
1-Propene, 2-methyl-	ACGIH TLV (United States, 1/2009). TWA: 250 ppm 8 hour(s).
Hexane	ACGIH TLV (United States, 1/2009). Absorbed through skin. TWA: 50 ppm 8 hour(s). NIOSH REL (United States, 6/2008). TWA: 180 mg/m ³ 10 hour(s). TWA: 50 ppm 10 hour(s). OSHA PEL (United States, 11/2006). TWA: 1800 mg/m ³ 8 hour(s). TWA: 500 ppm 8 hour(s). OSHA PEL 1989 (United States, 3/1989). TWA: 180 mg/m ³ 8 hour(s). TWA: 50 ppm 8 hour(s).
Butane, 2-methyl-	ACGIH TLV (United States, 1/2009). TWA: 600 ppm 8 hour(s).
Pentane	ACGIH TLV (United States, 1/2009). TWA: 600 ppm 8 hour(s). NIOSH REL (United States, 6/2008). CEIL: 1800 mg/m ³ 15 minute(s). CEIL: 610 ppm 15 minute(s). TWA: 350 mg/m ³ 10 hour(s). TWA: 120 ppm 10 hour(s). OSHA PEL (United States, 11/2006). TWA: 2950 mg/m ³ 8 hour(s). TWA: 1000 ppm 8 hour(s). OSHA PEL 1989 (United States, 3/1989). STEL: 2250 mg/m ³ 15 minute(s). STEL: 750 ppm 15 minute(s). TWA: 1800 mg/m ³ 8 hour(s).

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TWA: 600 ppm 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

- Melting/freezing point** : -210°C (-346°F) This is based on data for the following ingredient: Nitrogen.
Critical temperature : Lowest known value: -146.9°C (-232.4°F) (Nitrogen).
Vapor density : Highest known value: 0.967 (Air = 1) (Nitrogen).
Gas Density (lb/ft³) : Only known value: 0.072 (Nitrogen).

Section 10. Stability and reactivity

- Stability and reactivity** : The product is stable.
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
Carbon dioxide	LC50 Inhalation Gas.	Rat	470000 ppm	30 minutes
Carbon monoxide	TDL _o Intraperitoneal	Rat	35 mL/kg	-
	LC50 Inhalation Vapor	Rat	13500 mg/m ³	15 minutes
	LC50 Inhalation Vapor	Rat	1900 mg/m ³	4 hours
	LC50 Inhalation Gas.	Rat	3760 ppm	1 hours
	LC50 Inhalation Gas.	Mouse	2444 ppm	4 hours
	LC50 Inhalation Gas.	Rat	6600 ppm	30 minutes
	LC50 Inhalation Gas.	Rat	1807 ppm	4 hours
Isobutane	LC50 Inhalation Vapor	Rat	658000 mg/m ³	4 hours
	LC50 Inhalation Gas.	Rat	57 pph	15 minutes
Butane	LC50 Inhalation Vapor	Rat	658 g/m ³	4 hours
1-Pentene	LC50 Inhalation Vapor	Rat	175000 mg/m ³	4 hours
1,3-Butadiene	LD50 Oral	Rat	5480 mg/kg	-
	LC50 Inhalation Vapor	Rat	285 g/m ³	4 hours
	LC50 Inhalation Vapor	Rat	285000 mg/m ³	4 hours
	LC50 Inhalation Gas.	Rat	128000 ppm	4 hours
	LC50 Inhalation Vapor	Rat	470 mg/m ³	6 hours
Hydrogen sulfide (H ₂ S)	LC50 Inhalation Vapor	Rat	820 mg/m ³	3 hours
	LC50 Inhalation Vapor	Rat	700 mg/m ³	4 hours
	LC50 Inhalation Vapor	Rat	470 mg/m ³	6 hours
	LC50 Inhalation Gas.	Mouse	634 ppm	1 hours
	LC50 Inhalation	Rat	712 ppm	1 hours

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1-Propene, 2-methyl-	Gas.			
	LC50 Inhalation	Rat	550000 mg/m3	4 hours
Hexane	Vapor			
	LD50 Oral	Rat	25 g/kg	-
	LDLo Intraperitoneal	Rat	9100 mg/kg	-
	TDL0 Oral	Rat	20000 mg/kg	-
	LC50 Inhalation	Rat	627000 mg/m3	3 minutes
	Vapor			
	LC50 Inhalation	Rat	96000 ppm	1 hours
Butane, 2-methyl-	Vapor			
	LC50 Inhalation	Rat	48000 ppm	4 hours
	Gas.			
	LC50 Inhalation	Rat	280000 mg/m3	4 hours
	Vapor			
	LD50 Oral	Rat	>2000 mg/kg	-
	LC50 Inhalation	Rat	364 g/m3	4 hours
Pentane	Vapor			

Chronic effects on humans : **CARCINOGENIC EFFECTS:** Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Ethene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [1-Propene]. Classified 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by NIOSH [1,3-Butadiene]. Classified A2 (Suspected for humans.) by ACGIH [1,3-Butadiene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH [1-Propene, 2-methyl-].

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 : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

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 sulfide (H2S)	-	Acute EC50 770 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren - 10 mm	48 hours
	-	Acute EC50 540 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren - 10 mm	48 hours
	-	Acute LC50 7 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - FRY	96 hours
	-	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	Fish - Lake	96 hours

Flammable Gas Mixture: 1 Butene / 1 Pentene / 1,3 Butadiene / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N Butane / N Pentane / Nitrogen / Oxygen / Propane / Propylene / Trans-2-Butene

	water		whitefish - Coregonus clupeaformis - Yolk-sac fry	
	-	Acute LC50 <2 ug/L Fresh water	Fish - Yellow perch - Perca flavescens - Yolk- sac fry	96 hours
	-	Acute LC50 2 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
Hexane	-	Acute LC50 113000 ug/L Fresh water	Fish - Mozambique tilapia - Tilapia mossambica - 99 mm - 10 g	96 hours
	-	Acute LC50 2500 to 2980 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - 31 days - 20.4 mm - 0.123 g	96 hours

Products of degradation : Products of degradation: nitrogen oxides (NO, NO₂ etc.).

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	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	Not applicable (gas).		-
TDG Classification	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	Not applicable (gas).		<p>Explosive Limit and Limited Quantity Index 0.125</p> <p>ERAP Index 3000</p> <p>Passenger Carrying Ship Index Forbidden</p> <p>Passenger Carrying Road or Rail</p>

Flammable Gas Mixture: 1 Butene / 1 Pentene / 1,3 Butadiene / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N Butane / N Pentane / Nitrogen / Oxygen / Propane / Propylene / Trans-2-Butene

						Index Forbidden
Mexico Classification	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	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

: TSCA 4(a) final test rules: Pentane
TSCA 8(a) PAIR: Pentane

United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: Nitrogen

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:

Nitrogen: Sudden release of pressure

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 accidental release prevention: 1-Butene; 1-Pentene; 2-Butene, (2Z)-; Ethane; Ethene; Hydrogen; Hydrogen sulfide (H₂S); Isobutane ; 1-Propene, 2-methyl-; Butane, 2-methyl-; Methane; Butane ; Pentane; Propane; 1-Propene; 2-Butene, (2E)-

Clean Air Act (CAA) 112 regulated flammable substances: 1-Butene; 1-Pentene; 2-Butene, (2Z)-; Ethane; Ethene; Hydrogen; Isobutane ; 1-Propene, 2-methyl-; Butane, 2-methyl-; Methane; Butane ; Pentane; Propane; 1-Propene; 2-Butene, (2E)-

Clean Air Act (CAA) 112 regulated toxic substances: Hydrogen sulfide (H₂S)

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: 1,3-Butadiene	106-99-0	0.2
Supplier notification	: 1,3-Butadiene	106-99-0	0.2

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:** None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: NITROGEN
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: The following components are listed: NITROGEN (COMPRESSED OR LIQUIFIED); 1,3-BUTADIENE
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: None of the components are listed.
New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed:

Flammable Gas Mixture: 1 Butene / 1 Pentene / 1,3 Butadiene / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N Butane / N Pentane / Nitrogen / Oxygen / Propane / Propylene / Trans-2-Butene

NITROGEN; 1,3-BUTADIENE

Rhode Island Hazardous Substances: None of the components are listed.

California Prop. 65

: **WARNING:** This product contains a chemical known to the State of California to cause cancer.

WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name

Cancer

Reproductive

No significant risk level

Maximum acceptable dosage level

Carbon Monoxide
1,3-Butadiene

No.
Yes.

Yes.
Yes.

No.
Yes.

No.
No.

Canada

WHMIS (Canada)

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

CEPA Toxic substances: None of the components are listed.

Canadian ARET: None of the components are listed.

Canadian NPRI: None of the components are listed.

Alberta Designated Substances: None of the components are listed.

Ontario Designated Substances: None of the components are listed.

Quebec Designated Substances: None of the components are listed.

Section 16. Other information

United States

Label requirements

: FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
CANCER HAZARD - CONTAINS MATERIAL WHICH CAN CAUSE CANCER.
CONTENTS UNDER PRESSURE.

Canada

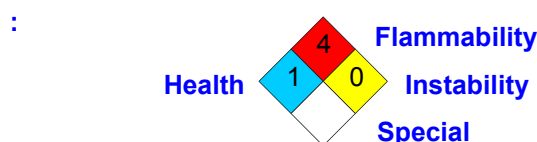
Label requirements

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

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

Health	*	1
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.