

SAFETY DATA SHEET

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

Section 1. Identification

- GHS product identifier** : Flammable Gas Mixture: 1-Butene / 1,3-Butadiene / 2-Methyl-2-Butene / Argon / Carbon Dioxide / Carbon Monoxide / Cis-2-Butene / Ethane / Ethylene / Hexane / Hydrogen / Hydrogen Sulfide / Isobutane / Isobutylene / Isopentane / Methane / N-Butane / N-Pentane / Nitrogen / Propane / Propylene / Trans-2-Butene
- Other means of identification** : Not available.
- Product use** : Synthetic/Analytical chemistry.
- SDS #** : 019450
- Supplier's details** : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253
- 24-hour telephone** : 1-866-734-3438

Section 2. Hazards identification

- OSHA/HCS status** : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
- Classification of the substance or mixture** : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Compressed gas
ACUTE TOXICITY (inhalation) - Category 4
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1
TOXIC TO REPRODUCTION (Fertility) - Category 1
TOXIC TO REPRODUCTION (Unborn child) - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
AQUATIC HAZARD (ACUTE) - Category 3
AQUATIC HAZARD (LONG-TERM) - Category 3

GHS label elements

Hazard pictograms



Signal word

: Danger

Hazard statements

- : Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May form explosive mixtures in Air.
May displace oxygen and cause rapid suffocation.
May increase respiration and heart rate.
Asphyxiating even with adequate oxygen.
Harmful if inhaled.
May cause genetic defects.
May cause respiratory irritation.
May cause cancer.

Section 2. Hazards identification

May damage fertility or the unborn child.
 May cause drowsiness and dizziness.
 Causes damage to organs through prolonged or repeated exposure.
 Harmful to aquatic life with long lasting effects.

Precautionary statements

- General** : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Do not depend on odor to detect presence of gas. Approach suspected leak area with caution.
- Prevention** : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe gas. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.
- Response** : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
- Storage** : Store locked up. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.
- Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.
- Hazards not otherwise classified** : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

- Substance/mixture** : Mixture
- Other means of identification** : Not available.

CAS number/other identifiers

- CAS number** : Not applicable.
- Product code** : 019450

Ingredient name	%	CAS number
hydrogen	0.0001 - 50	1333-74-0
methane	0.0001 - 50	74-82-8
Nitrogen	0.0001 - 20	7727-37-9
Carbon Dioxide	2 - 10	124-38-9
Propane	0.0001 - 10	74-98-6
ethane	0.0001 - 10	74-84-0
isobutane	0.0001 - 10	75-28-5
Argon	0.0001 - 10	7440-37-1
N-Butane	0.0001 - 10	106-97-8
propylene	0.0001 - 10	115-07-1
ethylene	1 - 10	74-85-1
Cis-2-Butene	0.0001 - 10	590-18-1
1-Butene	0.0001 - 10	106-98-9
carbon monoxide	5 - 6	630-08-0
hydrogen sulfide	1 - 1.1	7783-06-4
n-pentane	0.0001 - 1	109-66-0
isopentane	0.0001 - 1	78-78-4
Trans-2-Butene	0.0001 - 0.9999	624-64-6

Section 3. Composition/information on ingredients

Isobutylene	0.0001 - 0.9999	115-11-7
n-hexane	0.1 - 0.75	110-54-3
2-methyl-2-butene	0.1 - 0.75	513-35-9
1,3-butadiene	0.1 - 0.5	106-99-0

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.
- Skin contact** : Contact with rapidly expanding gas may cause burns or frostbite.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : Adverse symptoms may include the following: respiratory tract irritation, coughing, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness, reduced fetal weight, increase in fetal deaths, skeletal malformations
- Skin contact** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations
- Ingestion** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Section 4. First aid measures

- Specific treatments** : No specific treatment.
- Protection of first-aiders** : 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. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. This material is harmful to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
sulfur oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. 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

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
hydrogen methane Nitrogen Carbon Dioxide	Oxygen Depletion [Asphyxiant] Oxygen Depletion [Asphyxiant] Oxygen Depletion [Asphyxiant] ACGIH TLV (United States, 3/2016). Oxygen Depletion [Asphyxiant]. STEL: 54000 mg/m ³ 15 minutes. STEL: 30000 ppm 15 minutes. TWA: 9000 mg/m ³ 8 hours. TWA: 5000 ppm 8 hours. NIOSH REL (United States, 10/2013). STEL: 54000 mg/m ³ 15 minutes. STEL: 30000 ppm 15 minutes. TWA: 9000 mg/m ³ 10 hours. TWA: 5000 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 9000 mg/m ³ 8 hours. TWA: 5000 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). STEL: 54000 mg/m ³ 15 minutes.

Section 8. Exposure controls/personal protection

Propane	<p>STEL: 30000 ppm 15 minutes. TWA: 18000 mg/m³ 8 hours. TWA: 10000 ppm 8 hours. NIOSH REL (United States, 10/2013). TWA: 1800 mg/m³ 10 hours. TWA: 1000 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 1800 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 1800 mg/m³ 8 hours. TWA: 1000 ppm 8 hours.</p>
ethane isobutane	<p>Oxygen Depletion [Asphyxiant] NIOSH REL (United States, 4/2013). TWA: 1900 mg/m³ 10 hours. TWA: 800 ppm 10 hours. ACGIH TLV (United States, 6/2013). STEL: 1000 ppm 15 minutes. Oxygen Depletion [Asphyxiant]</p>
Argon N-Butane	<p>NIOSH REL (United States, 10/2013). TWA: 1900 mg/m³ 10 hours. TWA: 800 ppm 10 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 1900 mg/m³ 8 hours. TWA: 800 ppm 8 hours. ACGIH TLV (United States, 3/2015). STEL: 1000 ppm 15 minutes.</p>
propylene	<p>ACGIH TLV (United States, 1/2005). TWA: 500 ppm 8 hours. Form: All forms ACGIH TLV (United States, 3/2016). TWA: 500 ppm 8 hours. ACGIH TLV (United States, 3/2016). TWA: 200 ppm 8 hours.</p>
ethylene	<p>ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours.</p>
Cis-2-Butene	<p>ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours.</p>
1-Butene	<p>ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours.</p>
carbon monoxide	<p>ACGIH TLV (United States, 3/2016). TWA: 29 mg/m³ 8 hours. TWA: 25 ppm 8 hours. NIOSH REL (United States, 10/2013). CEIL: 229 mg/m³ CEIL: 200 ppm TWA: 40 mg/m³ 10 hours. TWA: 35 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 55 mg/m³ 8 hours. TWA: 50 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). CEIL: 229 mg/m³ CEIL: 200 ppm TWA: 40 mg/m³ 8 hours. TWA: 35 ppm 8 hours. ACGIH TLV (United States, 3/2016). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p>
hydrogen sulfide	<p>NIOSH REL (United States, 10/2013). CEIL: 15 mg/m³ 10 minutes. CEIL: 10 ppm 10 minutes. OSHA PEL 1989 (United States, 3/1989). STEL: 21 mg/m³ 15 minutes.</p>

Section 8. Exposure controls/personal protection

n-pentane	<p>STEL: 15 ppm 15 minutes. TWA: 14 mg/m³ 8 hours. TWA: 10 ppm 8 hours. OSHA PEL Z2 (United States, 2/2013). AMP: 50 ppm 10 minutes. CEIL: 20 ppm ACGIH TLV (United States, 3/2016). TWA: 1000 ppm 8 hours. NIOSH REL (United States, 10/2013). CEIL: 1800 mg/m³ 15 minutes. CEIL: 610 ppm 15 minutes. TWA: 350 mg/m³ 10 hours. TWA: 120 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 2950 mg/m³ 8 hours. TWA: 1000 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). STEL: 2250 mg/m³ 15 minutes. STEL: 750 ppm 15 minutes. TWA: 1800 mg/m³ 8 hours. TWA: 600 ppm 8 hours. ACGIH TLV (United States, 3/2016). TWA: 1000 ppm 8 hours. ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours. ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours. ACGIH TLV (United States, 3/2016). TWA: 250 ppm 8 hours. Absorbed through skin. TWA: 50 ppm 8 hours. NIOSH REL (United States, 10/2013). TWA: 180 mg/m³ 10 hours. TWA: 50 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 1800 mg/m³ 8 hours. TWA: 500 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 180 mg/m³ 8 hours. TWA: 50 ppm 8 hours. None. ACGIH TLV (United States, 3/2016). TWA: 4.4 mg/m³ 8 hours. TWA: 2 ppm 8 hours. OSHA PEL (United States, 6/2016). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p>
isopentane	
Trans-2-Butene	
Isobutylene	
n-hexane	
2-methyl-2-butene 1,3-butadiene	

Appropriate 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.

Environmental exposure controls

: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Section 8. Exposure controls/personal protection

Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : 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, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Skin protection**
- Hand protection** : 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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : 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. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
- Other skin protection** : Appropriate footwear and any additional skin protection measures 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 protection** : 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.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Gas.
- Color** : Not available.
- Melting/freezing point** : -86°C (-122.8°F) This is based on data for the following ingredient: hydrogen sulfide. Weighted average: -199.48°C (-327.1°F)
- Critical temperature** : Lowest known value: -240.15°C (-400.3°F) (hydrogen).
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Not available.
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Highest known value: 2.1 (Air = 1) (N-Butane). Weighted average: 0.98 (Air = 1)
- Gas Density (lb/ft³)** : Weighted average: 0.02
- Relative density** : Not applicable.

Section 9. Physical and chemical properties

Solubility	: Not available.
Solubility in water	: Not available.
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
SADT	: Not available.
Viscosity	: Not applicable.

Section 10. Stability and reactivity

Reactivity	: No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Incompatible materials	: Oxidizers
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

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
isobutane	LC50 Inhalation Vapor	Rat	658000 mg/m ³	4 hours
N-Butane	LC50 Inhalation Vapor	Rat	658000 mg/m ³	4 hours
carbon monoxide	LC50 Inhalation Gas.	Rat	3760 ppm	1 hours
hydrogen sulfide	LC50 Inhalation Gas.	Rat	712 ppm	1 hours
n-pentane	LC50 Inhalation Vapor	Rat	364 g/m ³	4 hours
isopentane	LC50 Inhalation Vapor	Rat	280000 mg/m ³	4 hours
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m ³	4 hours
n-hexane	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
	LC50 Inhalation Vapor	Rat	96000 ppm	1 hours
	LD50 Oral	Rat	15840 mg/kg	-
1,3-butadiene	LC50 Inhalation Gas.	Rat	128000 ppm	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
n-hexane	Eyes - Mild irritant	Rabbit	-	10 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Section 11. Toxicological information

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
ethylene	-	3	-
propylene	-	3	-
1,3-butadiene	-	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
ethylene	Category 3	Not applicable.	Narcotic effects
hydrogen sulfide	Category 3	Not applicable.	Respiratory tract irritation
n-pentane	Category 3	Not applicable.	Narcotic effects
isopentane	Category 3	Not applicable.	Narcotic effects
n-hexane	Category 3	Not applicable.	Narcotic effects
2-methyl-2-butene	Category 3	Not applicable.	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
carbon monoxide	Category 1	Not determined	Not determined
n-hexane	Category 2	Not determined	Not determined

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

- Eye contact** : Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Harmful if inhaled. Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. May cause respiratory irritation.
- Skin contact** : Contact with rapidly expanding gas may cause burns or frostbite.
- Ingestion** : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : No specific data.
- Inhalation** : Adverse symptoms may include the following: respiratory tract irritation, coughing, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness, reduced fetal weight, increase in fetal deaths, skeletal malformations
- Skin contact** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations
- Ingestion** : Adverse symptoms may include the following: reduced fetal weight, increase in fetal deaths, skeletal malformations

Section 11. Toxicological information

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : Causes damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : May cause genetic defects.

Teratogenicity : May damage the unborn child.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : May damage fertility.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
hydrogen sulfide	Acute EC50 62 µg/l Fresh water	Crustaceans - Gammarus pseudolimnaeus	2 days
	Acute LC50 2 µg/l Fresh water	Fish - Coregonus clupeaformis - Yolk-sac fry	96 hours
n-hexane	Acute LC50 113000 µg/l Fresh water	Fish - Oreochromis mossambicus	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
methane	1.09	-	low
Nitrogen	0.67	-	low
Carbon Dioxide	0.83	-	low
Propane	1.09	-	low
ethane	1.09	-	low
isobutane	2.8	-	low
Argon	0.74	-	low
N-Butane	2.89	-	low
propylene	1.77	-	low
ethylene	1.13	-	low
Cis-2-Butene	2.33	-	low
1-Butene	2.4	-	low
n-pentane	3.45	171	low

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

Section 12. Ecological information

isopentane	3	171	low
Trans-2-Butene	2.31	-	low
Isobutylene	2.34	-	low
n-hexane	4	501.187	high
2-methyl-2-butene	2.67	-	low
1,3-butadiene	1.99	10	low

Mobility in soil

Soil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.






Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Hydrogen sulfide; Hydrogen sulfide H2S	7783-06-4	Listed	U135

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1954	UN1954	UN1954	UN1954	UN1954
UN proper shipping name	COMPRESSED GAS, FLAMMABLE, N.O.S. (methane, hydrogen)	COMPRESSED GAS, FLAMMABLE, N.O.S. (methane, hydrogen)	COMPRESSED GAS, FLAMMABLE, N.O.S. (methane, hydrogen)	COMPRESSED GAS, FLAMMABLE, N.O.S. (methane, hydrogen)	COMPRESSED GAS, FLAMMABLE, N.O.S. (methane, hydrogen)
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	Reportable quantity 2000 lbs / 908 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2). Explosive Limit and Limited Quantity Index 0.125 ERAP Index 3000	-	-	-

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

Section 14. Transport information

		<u>Passenger Carrying Ship Index</u> Forbidden			
		<u>Passenger Carrying Road or Rail Index</u> Forbidden			

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

Special precautions for user : **Transport within user’s premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) PAIR: pentane
 TSCA 8(a) CDR Exempt/Partial exemption: Not determined
 United States inventory (TSCA 8b): All components are listed or exempted.
 Clean Water Act (CWA) 311: hydrogen sulfide
 Clean Air Act (CAA) 112 regulated flammable substances: hydrogen; methane; propane; ethane; Isobutane; N-Butane; propylene; pentane; Isopentane; ethylene; Cis-2-Butene; 1-butene
 Clean Air Act (CAA) 112 regulated toxic substances: hydrogen sulfide

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
hydrogen sulfide	1 - 1.1	Yes.	500	-	100	-

SARA 304 RQ : 9090.9 lbs / 4127.3 kg

SARA 311/312

Classification : Fire hazard
 Sudden release of pressure
 Immediate (acute) health hazard
 Delayed (chronic) health hazard

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
hydrogen	0.0001 - 50	Yes.	Yes.	No.	No.	No.
methane	0.0001 - 50	Yes.	Yes.	No.	No.	No.
Nitrogen	0.0001 - 20	No.	Yes.	No.	No.	No.
Carbon Dioxide	2 - 10	No.	Yes.	No.	No.	No.
Propane	0.0001 - 10	Yes.	Yes.	No.	No.	No.
ethane	0.0001 - 10	Yes.	Yes.	No.	No.	No.
isobutane	0.0001 - 10	Yes.	Yes.	No.	No.	No.
Argon	0.0001 - 10	No.	Yes.	No.	No.	No.
N-Butane	0.0001 - 10	Yes.	Yes.	No.	No.	No.
propylene	0.0001 - 10	Yes.	Yes.	No.	No.	No.
ethylene	1 - 10	Yes.	Yes.	No.	Yes.	No.
Cis-2-Butene	0.0001 - 10	Yes.	Yes.	No.	No.	No.
1-Butene	0.0001 - 10	Yes.	Yes.	No.	No.	No.
carbon monoxide	5 - 6	Yes.	Yes.	No.	Yes.	Yes.
hydrogen sulfide	1 - 1.1	Yes.	Yes.	No.	Yes.	No.
n-pentane	0.0001 - 1	Yes.	No.	No.	Yes.	No.
isopentane	0.0001 - 1	Yes.	No.	No.	Yes.	No.
Trans-2-Butene	0.0001 - 0.9999	Yes.	Yes.	No.	No.	No.
Isobutylene	0.0001 - 0.9999	Yes.	Yes.	No.	No.	No.
n-hexane	0.1 - 0.75	Yes.	No.	No.	Yes.	Yes.
2-methyl-2-butene	0.1 - 0.75	Yes.	No.	No.	Yes.	Yes.
1,3-butadiene	0.1 - 0.5	Yes.	Yes.	Yes.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	ethylene	74-85-1	1 - 10
	propylene	115-07-1	0.0001 - 10
	hydrogen sulfide	7783-06-4	1 - 1.1
	1,3-butadiene	106-99-0	0.1 - 0.5
Supplier notification	ethylene	74-85-1	1 - 10
	propylene	115-07-1	0.0001 - 10
	hydrogen sulfide	7783-06-4	1 - 1.1
	1,3-butadiene	106-99-0	0.1 - 0.5

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

State regulations

Massachusetts

: The following components are listed: HYDROGEN; METHANE; MARSH GAS; NITROGEN; NITROGEN (LIQUIFIED); CARBON DIOXIDE; PROPANE; ETHANE; CARBON MONOXIDE; ISOBUTANE; ARGON; BUTANE; PROPYLENE; PROPENE; PENTANE; ISOPENTANE; HYDROGEN SULFIDE; ETHYLENE; ETHENE; 2-BUTENE-CIS; 1-BUTENE

New York

: The following components are listed: Hydrogen sulfide; Hydrosulfuric acid

New Jersey

: The following components are listed: HYDROGEN; METHANE; NITROGEN; CARBON DIOXIDE; CARBONIC ACID GAS; PROPANE; ETHANE; CARBON MONOXIDE; Isobutane; PROPANE, 2-METHYL-; ARGON; BUTANE; PROPYLENE; 1-PROPENE; PENTANE; ISOPENTANE; BUTANE, 2-METHYL-; HYDROGEN SULFIDE; ETHYLENE; ETHENE; 2-BUTENE-cis; 2-BUTENE, (2Z)-; 1-BUTENE; 1,3-BUTADIENE; BIETHYLENE

Pennsylvania

: The following components are listed: HYDROGEN; METHANE; NITROGEN; CARBON DIOXIDE; PROPANE; ETHANE; CARBON MONOXIDE; PROPANE, 2-METHYL-; ARGON; BUTANE; 1-PROPENE; PENTANE; BUTANE, 2-METHYL-; HYDROGEN SULFIDE; ETHENE; 2-BUTENE, (Z)-; 1-BUTENE; 1,3-BUTADIENE

California Prop. 65

Section 15. Regulatory information

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
carbon monoxide	No.	Yes.	No.	No.
1,3-butadiene	Yes.	Yes.	Yes.	No.

International regulations

International lists

National inventory

- Australia** : All components are listed or exempted.
- Canada** : All components are listed or exempted.
- China** : All components are listed or exempted.
- Europe** : All components are listed or exempted.
- Japan** : Not determined.
- Malaysia** : Not determined.
- New Zealand** : All components are listed or exempted.
- Philippines** : All components are listed or exempted.
- Republic of Korea** : All components are listed or exempted.
- Taiwan** : Not determined.

Canada

WHMIS (Canada)

- : Class A: Compressed gas.
- Class B-1: Flammable gas.
- Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
- Class D-2A: Material causing other toxic effects (Very toxic).
- Class D-2B: Material causing other toxic effects (Toxic).
- CEPA Toxic substances:** The following components are listed: Methane; Carbon dioxide; Volatile organic compounds; 1,3-Butadiene
- Canadian ARET:** None of the components are listed.
- Canadian NPRI:** The following components are listed: Volatile organic compounds; Propane; Volatile organic compounds; Carbon monoxide; Butane (all isomers); Butane (all isomers); Propylene; Pentane (all isomers); Pentane (all isomers); Hydrogen sulphide; Ethylene; Butene (all isomers); Butene (all isomers)
- 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

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

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

Health	1
Flammability	4
Physical hazards	3

Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

[National Fire Protection Association \(U.S.A.\)](#)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

[Procedure used to derive the classification](#)

Classification	Justification
Flam. Gas 1, H220	On basis of test data
Press. Gas Comp. Gas, H280	On basis of test data
Acute Tox. 4, H332	Expert judgment
Muta. 1B, H340	Calculation method
Carc. 1, H350	Calculation method
Repr. 1, H360 (Fertility)	Expert judgment
Repr. 1, H360 (Unborn child)	Expert judgment
STOT SE 3, H335	Expert judgment
STOT SE 3, H336	Expert judgment
STOT RE 1, H372	Calculation method
Aquatic Acute 3, H402	Expert judgment
Aquatic Chronic 3, H412	Expert judgment

[History](#)

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Date of previous issue : No previous validation
Version : 1

[Key to abbreviations](#)

: ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 UN = United Nations

[References](#)

: Not available.

▣ Indicates information that has changed from previously issued version.

[Notice to reader](#)

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

Section 16. Other information

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.