

SAFETY DATA SHEET

Flammable Gas Mixture: 1-Butene / 1-Hexene / 1-Octene / 2,4-Dimethylheptane / Argon / Carbon Dioxide / Carbon Monoxide / Ethane / Ethylene / Ethylene Oxide / Hydrogen / Isopentane / Methane / Methanol / N-Pentane / Nitrogen / Propane / Propylene

Section 1. Identification

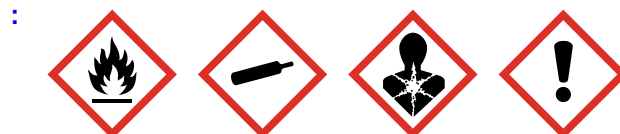
GHS product identifier	: Flammable Gas Mixture: 1-Butene / 1-Hexene / 1-Octene / 2,4-Dimethylheptane / Argon / Carbon Dioxide / Carbon Monoxide / Ethane / Ethylene / Ethylene Oxide / Hydrogen / Isopentane / Methane / Methanol / N-Pentane / Nitrogen / Propane / Propylene
Other means of identification	: Not available.
Product type	: Gas.
Product use	: Synthetic/Analytical chemistry.
SDS #	: 021748
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 SKIN IRRITATION - Category 2 GERM CELL MUTAGENICITY - Category 1 CARCINOGENICITY - Category 1B TOXIC TO REPRODUCTION (Fertility) - Category 1 TOXIC TO REPRODUCTION (Unborn child) - Category 1 SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3 SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

GHS label elements

Hazard pictograms



Signal word

: Danger

Hazard statements

: Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
May damage fertility or the unborn child.
May cause drowsiness or dizziness.
Causes damage to organs through prolonged or repeated exposure.
May increase respiration and heart rate.
Asphyxiating even with adequate oxygen.

Precautionary statements

Section 2. Hazards identification

- 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. 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. 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. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. 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. 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.
- Product code** : 021748

Ingredient name	%	CAS number
Propane	0.0001 - 90	74-98-6
ethane	0.0001 - 90	74-84-0
hydrogen	0.0001 - 90	1333-74-0
propylene	0.0001 - 90	115-07-1
ethylene	1 - 90	74-85-1
methane	0.0001 - 90	74-82-8
Argon	0.0001 - 10	7440-37-1
Carbon Dioxide	2 - 10	124-38-9
1-Butene	0.0001 - 10	106-98-9
Nitrogen	0.0001 - 10	7727-37-9
carbon monoxide	1 - 5	630-08-0
ethylene oxide	1 - 1.5	75-21-8
isopentane	0.0001 - 0.5	78-78-4
methanol	0.0001 - 0.5	67-56-1
n-pentane	0.0001 - 0.5	109-66-0
oct-1-ene	0.0001 - 0.05	111-66-0
1-Hexene	0.0001 - 0.05	592-41-6
2,4-dimethyl heptane	0.0001 - 0.05	2213-23-2

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** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.
- Skin contact** : Causes skin irritation. 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** : Adverse symptoms may include the following:., pain or irritation, watering, redness
- Inhalation** : Adverse symptoms may include the following:., 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:., irritation, redness, 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.
- 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.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen 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 specialized 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).

Methods and materials for containment and cleaning up

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. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. 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.

Section 7. Handling and storage

Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not breathe gas. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid exposure during pregnancy.

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). Eliminate all ignition sources. 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). Store locked up. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Propane	NIOSH REL (United States, 10/2016). TWA: 1800 mg/m ³ 10 hours. TWA: 1000 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 1800 mg/m ³ 8 hours. TWA: 1000 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). TWA: 1800 mg/m ³ 8 hours. TWA: 1000 ppm 8 hours. ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].
ethane	ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].
hydrogen	California PEL for Chemical Contaminants (Table AC-1) (United States). Oxygen Depletion [Asphyxiant].
propylene	ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant]. ACGIH TLV (United States, 3/2017). TWA: 500 ppm 8 hours. ACGIH TLV (United States, 1/2005). TWA: 500 ppm 8 hours. Form: All forms
ethylene	ACGIH TLV (United States, 3/2017). TWA: 200 ppm 8 hours.
methane	None.
Argon	ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].
Carbon Dioxide	ACGIH TLV (United States, 3/2017). 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, 10/2016).

Section 8. Exposure controls/personal protection

1-Butene

Nitrogen

carbon monoxide

ethylene oxide

isopentane

methanol

STEL: 54000 mg/m³ 15 minutes.

STEL: 30000 ppm 15 minutes.

TWA: 9000 mg/m³ 10 hours.

TWA: 5000 ppm 10 hours.

OSHA PEL (United States, 6/2016).

TWA: 9000 mg/m³ 8 hours.

TWA: 5000 ppm 8 hours.

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

STEL: 54000 mg/m³ 15 minutes.

STEL: 30000 ppm 15 minutes.

TWA: 18000 mg/m³ 8 hours.

TWA: 10000 ppm 8 hours.

ACGIH TLV (United States, 3/2017).

TWA: 250 ppm 8 hours.

ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].

California PEL for Chemical Contaminants (Table AC-1) (United States).

PEL: 25 ppm 8 hours.

CEIL: 200 ppm

ACGIH TLV (United States, 3/2017).

TWA: 25 ppm 8 hours.

TWA: 29 mg/m³ 8 hours.

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

TWA: 35 ppm 8 hours.

TWA: 40 mg/m³ 8 hours.

CEIL: 200 ppm

CEIL: 229 mg/m³

NIOSH REL (United States, 10/2016).

TWA: 35 ppm 10 hours.

TWA: 40 mg/m³ 10 hours.

CEIL: 200 ppm

CEIL: 229 mg/m³

OSHA PEL (United States, 6/2016).

TWA: 50 ppm 8 hours.

TWA: 55 mg/m³ 8 hours.

ACGIH TLV (United States, 3/2017).

TWA: 1.8 mg/m³ 8 hours.

TWA: 1 ppm 8 hours.

NIOSH REL (United States, 10/2016).

CEIL: 9 mg/m³ 10 minutes.

CEIL: 5 ppm 10 minutes.

TWA: 0.18 mg/m³ 10 hours.

TWA: 0.1 ppm 10 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.

ACGIH TLV (United States, 3/2017).

TWA: 1000 ppm 8 hours.

ACGIH TLV (United States, 3/2017).

Absorbed through skin.

STEL: 328 mg/m³ 15 minutes.

STEL: 250 ppm 15 minutes.

TWA: 262 mg/m³ 8 hours.

TWA: 200 ppm 8 hours.

NIOSH REL (United States, 10/2016).

Absorbed through skin.

Section 8. Exposure controls/personal protection

n-pentane	<p>STEL: 325 mg/m³ 15 minutes. STEL: 250 ppm 15 minutes. TWA: 260 mg/m³ 10 hours. TWA: 200 ppm 10 hours. OSHA PEL (United States, 6/2016). TWA: 260 mg/m³ 8 hours. TWA: 200 ppm 8 hours. OSHA PEL 1989 (United States, 3/1989). Absorbed through skin. STEL: 325 mg/m³ 15 minutes. STEL: 250 ppm 15 minutes. TWA: 260 mg/m³ 8 hours. TWA: 200 ppm 8 hours.</p> <p>ACGIH TLV (United States, 3/2017). TWA: 1000 ppm 8 hours. NIOSH REL (United States, 10/2016). 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.</p> <p>AIHA WEEL (United States, 10/2011). TWA: 75 ppm 8 hours. ACGIH TLV (United States, 3/2017). TWA: 50 ppm 8 hours. None.</p>
oct-1-ene	
1-Hexene	
2,4-dimethyl heptane	

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.

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: chemical splash goggles.

Skin protection

Section 8. Exposure controls/personal 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** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. 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.
- Odor** : Not available.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : -111.7°C (-169.1°F) This is based on data for the following ingredient: ethylene oxide. Weighted average: -195.87°C (-320.6°F)
- Boiling point** : Not available.
- Critical temperature** : Lowest known value: -240.15°C (-400.3°F) (hydrogen).
- Flash point** : Not available.
- 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: 1.93 (Air = 1) (1-butene). Weighted average: 1.01 (Air = 1)
- Gas Density (lb/ft³)** : Weighted average: 0.02
- Relative density** : Not applicable.
- Solubility** : Not available.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- Viscosity** : Not applicable.
- Flow time (ISO 2431)** : Not available.

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
carbon monoxide	LC50 Inhalation Gas.	Rat	3760 ppm	1 hours
ethylene oxide	LC50 Inhalation Gas.	Rat	800 ppm	4 hours
isopentane	LC50 Inhalation Vapor	Rat	280000 mg/m ³	4 hours
methanol	LC50 Inhalation Gas.	Rat	145000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	64000 ppm	4 hours
n-pentane	LC50 Inhalation Vapor	Rat	364 g/m ³	4 hours
oct-1-ene	LC50 Inhalation Vapor	Rat	8050 ppm	4 hours
	LD50 Oral	Rabbit	2000 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
1-Hexene	LC50 Inhalation Gas.	Rat	32000 ppm	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
ethylene oxide	Eyes - Moderate irritant	Rabbit	-	6 hours 18 milligrams	-
methanol	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Eyes - Moderate irritant	Rabbit	-	40 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

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Product/ingredient name	OSHA	IARC	NTP
propylene	-	3	-
ethylene	-	3	-
ethylene oxide	+	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
ethylene oxide	Category 3	Not applicable.	Respiratory tract irritation
isopentane	Category 3	Not applicable.	Narcotic effects
methanol	Category 1	Not determined	respiratory tract
n-pentane	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

Aspiration hazard

Name	Result
isopentane	ASPIRATION HAZARD - Category 1
2,4-dimethyl heptane	ASPIRATION HAZARD - Category 1

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** : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.
- Skin contact** : Causes skin irritation. 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** : Adverse symptoms may include the following: pain or irritation, watering, redness
- Inhalation** : Adverse symptoms may include the following: 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: irritation, redness, 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

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

Short term exposure

Potential immediate effects : Not available.

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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

Route	ATE value
Inhalation (gases)	23850.1 ppm

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
ethylene oxide	Acute LC50 490000 µg/l Marine water	Crustaceans - Artemia sp.	48 hours
	Acute LC50 300000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 84000 to 96000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
methanol	Acute EC50 16.912 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute LC50 2500000 µg/l Marine water	Crustaceans - Crangon crangon - Adult	48 hours
	Acute LC50 3289 mg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 290 mg/l Fresh water	Fish - Danio rerio - Egg	96 hours
oct-1-ene	Chronic NOEC 9.96 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute LC50 4.8 mg/l Fresh water	Fish - Danio rerio - Young	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
Propane	1.09	-	low
ethane	1.09	-	low
propylene	1.77	-	low
ethylene	1.13	-	low
methane	1.09	-	low
Argon	0.74	-	low
Carbon Dioxide	0.83	-	low
1-Butene	2.4	-	low
Nitrogen	0.67	-	low
ethylene oxide	-0.3	-	low

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isopentane	3	171	low
methanol	-0.77	<10	low
n-pentane	3.45	171	low
oct-1-ene	4.47	3.1	low
1-Hexene	3.87	2.59	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
Ethylene oxide (I,T); Oxirane (I,T)	75-21-8	Listed	U115

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. (nitrogen, methane)	COMPRESSED GAS, FLAMMABLE, N. O.S. (nitrogen, methane)	COMPRESSED GAS, FLAMMABLE, N. O.S. (nitrogen, methane)	COMPRESSED GAS, FLAMMABLE, N. O.S. (nitrogen, methane)	COMPRESSED GAS, FLAMMABLE, N. O.S. (nitrogen, methane)
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

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

Additional information

DOT Classification : **Reportable quantity** 666.67 lbs / 302.67 kg. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

Section 14. Transport information

TDG Classification : 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
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden

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 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
Clean Air Act (CAA) 112 regulated flammable substances: methane; ethylene; propylene; hydrogen; ethane; propane; 1-butene
Clean Air Act (CAA) 112 regulated toxic substances: ethylene oxide

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)
ethylene oxide	1 - 1.5	Yes.	1000	-	10	-

SARA 304 RQ : 666.7 lbs / 302.7 kg

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	propylene	115-07-1	0.0001 - 90
	ethylene	74-85-1	1 - 90
	ethylene oxide	75-21-8	1 - 1.5
Supplier notification	propylene	115-07-1	0.0001 - 90
	ethylene	74-85-1	1 - 90
	ethylene oxide	75-21-8	1 - 1.5

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

Section 15. Regulatory information

- Massachusetts** : The following components are listed: METHANE; MARSH GAS; ETHYLENE; ETHENE; PROPYLENE; PROPENE; HYDROGEN; ETHANE; PROPANE; ARGON; ETHYLENE OXIDE; NITROGEN; NITROGEN (LIQUIFIED); 1-BUTENE; CARBON MONOXIDE; CARBON DIOXIDE
- New York** : The following components are listed: Ethylene oxide; Oxirane
- New Jersey** : The following components are listed: METHANE; ETHYLENE; ETHENE; PROPYLENE; 1-PROPENE; HYDROGEN; ETHANE; PROPANE; ARGON; ETHYLENE OXIDE; 1, 2-EPOXYETHANE; NITROGEN; 1-BUTENE; CARBON MONOXIDE; CARBON DIOXIDE; CARBONIC ACID GAS
- Pennsylvania** : The following components are listed: METHANE; ETHENE; 1-PROPENE; HYDROGEN; ETHANE; PROPANE; ARGON; OXIRANE; NITROGEN; 1-BUTENE; CARBON MONOXIDE; CARBON DIOXIDE

California Prop. 65

⚠ WARNING: This product can expose you to ethylene oxide, which is known to the State of California to cause cancer and birth defects or other reproductive harm. This product can expose you to chemicals including Carbon monoxide, methanol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Carbon monoxide	-	-
methanol	-	-
ethylene oxide	-	-

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Ingredient name	Status
Ethylene oxide (ISO); Amprolene; Oxirane; 1,2-Epoxyethane; EO	Pesticide

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Inventory list

- Australia** : Not determined.
- Canada** : Not determined.
- China** : All components are listed or exempted.
- Europe** : Not determined.
- Japan** : **Japan inventory (ENCS):** Not determined.
Japan inventory (ISHL): Not determined.
- Malaysia** : Not determined.
- New Zealand** : Not determined.
- Philippines** : Not determined.
- Republic of Korea** : Not determined.
- Taiwan** : All components are listed or exempted.
- Thailand** : Not determined.
- Turkey** : Not determined.

Section 15. Regulatory information

United States : Not determined.

Viet Nam : Not determined.

Section 16. Other information

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

Health	*	2
Flammability		4
Physical hazards		3

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 and the associated label are not required on SDSs or products leaving a facility 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 trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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
FLAMMABLE GASES - Category 1	On basis of test data
GASES UNDER PRESSURE - Compressed gas	On basis of test data
SKIN IRRITATION - Category 2	Expert judgment
GERM CELL MUTAGENICITY - Category 1	Calculation method
CARCINOGENICITY - Category 1B	Calculation method
TOXIC TO REPRODUCTION (Fertility) - Category 1	Calculation method
TOXIC TO REPRODUCTION (Unborn child) - Category 1	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1	Calculation method

History

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Section 16. Other information

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 = 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.

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