Material Safety Data Sheet

32 Component Flammable Gas Mixture

1. Product and company identification

Product name : 32 Component Flammable Gas Mixture

Synonym : Not available.

Trade name : Not available.

Product Grade : Not available.

Manufacturer : Praxair, Inc.
39 Old Ridgebury Rd.
Danbury CT 06810-5113

MSDS # : P-18-1777

Validation date : January 15, 2014.

Print date : January 15, 2014.

In case of emergency : Emergencies: 1-800-645-4633*
Chemtrec: 1-800-424-9300*
Routine: 1-800-PRAXAIR
*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).

Product type : Gas.

2. Hazards identification

Physical state : Gas.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : **DANGER!**

FLAMMABLE HIGH PRESSURE GAS. CAN FORM EXPLOSIVE MIXTURES WITH AIR.HARMFUL IF INHALED.GAS REDUCES OXYGEN AVAILABLE FOR BREATHING. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CAN CAUSE TARGET ORGAN DAMAGE.May cause liver, kidney, nervous system and respiratory system damage.May cause heart disturbances.CAN INCREASE RESPIRATION. CANCER HAZARD - CAN CAUSE CANCER. Can cause damage to blood forming tissues.REPRODUCTIVE HAZARD. SYMPTOMS MAY BE DELAYED.

Contains gas under pressure. Flammable gas. Flammable material In a fire or if heated, a pressure increase will occur and the container may burst or explode. Harmful by inhalation. May be harmful if absorbed through skin. Simple asphyxiant. At very high concentrations, can displace the normal air and cause suffocation from lack of oxygen. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not enter storage areas and confined spaces unless adequately ventilated. Avoid exposure - obtain special instructions before use. Do not breathe gas. Do not get in eyes. Avoid contact with skin and clothing. Can cause target organ damage. Can cause cancer. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Inhalation.

Potential acute health effects

Inhalation : Toxic by inhalation. At very high concentrations, can displace the normal air and cause suffocation from lack of oxygen.

Ingestion : As this product is a gas, refer to the inhalation section.

Skin : Harmful in contact with skin. Contact with rapidly expanding gas may cause burns or frostbite.

Eyes : Contact with rapidly expanding gas may cause burns or frostbite.

2. Hazards identification

Potential chronic health effects

Chronic effects : Can cause target organ damage.

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

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Target organs : Contains material which causes damage to the following organs: lungs, eyes. Contains material which may cause damage to the following organs: blood, the nervous system, heart, cardiovascular system, upper respiratory tract, skin, central nervous system (CNS), muscle tissue.

Over-exposure signs/symptoms

Inhalation : No specific data.

Ingestion : No specific data.

Skin : No specific data.

Eyes : No specific data.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

3. Composition/information on ingredients

United States

Name	CAS number	%
1-Butene	106-98-9	0.5
pent-1-ene	109-67-1	0.02
1,3-butadiene	106-99-0	0.2
2-methylbut-2-ene	513-35-9	0.02
2,2-dimethylbutane	75-83-2	0.02
2,2-dimethylpropane	463-82-1	0.05
3-methylbut-1-ene	563-45-1	0.02
acetylene	74-86-2	1
argon	7440-37-1	0.4
benzene	71-43-2	0.02
butane	106-97-8	2
carbon dioxide	124-38-9	2
carbon monoxide	630-08-0	1
cis-2-Butene	590-18-1	0.2
ethane	74-84-0	5
ethylene	74-85-1	2
heptane	142-82-5	0.02
helium	7440-59-7	1
n-hexane	110-54-3	0.02
isobutane	75-28-5	1
Isobutylene	115-11-7	0.5
isopentane	78-78-4	0.05
Methane	74-82-8	10
nitrogen	7727-37-9	0.7
pentane	109-66-0	0.05
allene	463-49-0	0.2
propane	74-98-6	2
propylene	115-07-1	0.5
toluene	108-88-3	0.02
(E)-but-2-ene	624-64-6	0.2

3. Composition/information on ingredients

hydrogen	1333-74-0	69.27

4. First aid measures

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. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

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.

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.

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product : Contains gas under pressure. 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.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Special exposure hazards : 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.

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

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.

6. Accidental release measures

Personal precautions : Accidental releases pose a serious fire or explosion hazard. Immediately contact emergency personnel. 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. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

6. Accidental release measures

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 for 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.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). 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. Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. 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 non-sparking tools. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.
Protect cylinder from damage. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. Close valve after each use; keep closed even when empty.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax: (703) 934-1830, website: www.cganet.com.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use.

PRECAUTIONS TO BE TAKEN IN STORAGE:
Store and use with adequate ventilation. Separate flammable cylinders from oxygen, chlorine, and other oxidizers by at least 20 feet or use a barricade of non-combustible material. This barricade should be at least 5 feet high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Post “No Smoking or Open Flames” sighs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage area must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 125 ˚F (52˚C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. For full details and requirements, see NFPA 50A, published by the National Fire Protection Association.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE AND USE:
Flammable, high-pressure gas. Use only in a closed system. Use piping and equipment adequately designed to withstand pressures and temperatures to be encountered. Use only spark-proof tools and explosion-proof equipment. Keep away from heat, open flame and sparks. **Gas can cause rapid suffocation due to oxygen**

7. Handling and storage

deficiency. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. **Prevent reverse flow.** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Blow the system down in an environmentally safe manner in compliance with all federal, provincial, and local laws, then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.**

8. Exposure controls/personal protection

United States

Ingredient	Exposure limits
hydrogen	Oxygen Depletion [Asphyxiant]
Methane	**ACGIH TLV (United States, 1/2009).** TWA: 1000 ppm 8 hour(s).
ethane	**ACGIH TLV (United States, 1/2009).** TWA: 1000 ppm 8 hour(s).
butane	**OSHA PEL 1989 (United States, 3/1989).** TWA: 800 ppm 8 hour(s). TWA: 1900 mg/m³ 8 hour(s). **NIOSH REL (United States, 6/2009).** TWA: 800 ppm 10 hour(s). TWA: 1900 mg/m³ 10 hour(s). **ACGIH TLV (United States, 1/2013).** STEL (15 mins): 1000 ppm 15 minute(s).
carbon dioxide	**ACGIH TLV (United States, 1/2009).** TWA: 5000 ppm 8 hour(s). TWA: 9000 mg/m³ 8 hour(s). STEL: 30000 ppm 15 minute(s). STEL: 54000 mg/m³ 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 10000 ppm 8 hour(s). TWA: 18000 mg/m³ 8 hour(s). STEL: 30000 ppm 15 minute(s). STEL: 54000 mg/m³ 15 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 5000 ppm 10 hour(s). TWA: 9000 mg/m³ 10 hour(s). STEL: 30000 ppm 15 minute(s). STEL: 54000 mg/m³ 15 minute(s). **OSHA PEL (United States, 11/2006).** TWA: 5000 ppm 8 hour(s). TWA: 9000 mg/m³ 8 hour(s).
ethylene	**ACGIH TLV (United States, 1/2009).** TWA: 200 ppm 8 hour(s).
propane	**OSHA PEL 1989 (United States, 3/1989).** TWA: 1000 ppm 8 hour(s). TWA: 1800 mg/m³ 8 hour(s). **NIOSH REL (United States, 6/2009).** TWA: 1000 ppm 10 hour(s). TWA: 1800 mg/m³ 10 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 1000 ppm 8 hour(s). TWA: 1800 mg/m³ 8 hour(s). **ACGIH TLV (United States, 1/2009).** TWA: 1000 ppm 8 hour(s).
acetylene	**NIOSH REL (United States, 6/2009).**

8. Exposure controls/personal protection

	CEIL: 2500 ppm CEIL: 2662 mg/m³
carbon monoxide	**ACGIH (United States).** TWA: 25 ppm 8 hour(s). **OSHA (United States).** TWA: 50 ppm 8 hour(s). **ACGIH TLV (United States, 1/2009).** TWA: 25 ppm 8 hour(s). TWA: 29 mg/m³ 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 35 ppm 8 hour(s). TWA: 40 mg/m³ 8 hour(s). CEIL: 200 ppm CEIL: 229 mg/m³ **NIOSH REL (United States, 6/2009).** TWA: 35 ppm 10 hour(s). TWA: 40 mg/m³ 10 hour(s). CEIL: 200 ppm CEIL: 229 mg/m³ **OSHA PEL (United States, 11/2006).** TWA: 50 ppm 8 hour(s). TWA: 55 mg/m³ 8 hour(s).
isobutane	**NIOSH REL (United States, 6/2009).** TWA: 800 ppm 10 hour(s). TWA: 1900 mg/m³ 10 hour(s). **ACGIH TLV (United States, 1/2009).** TWA: 1000 ppm 8 hour(s).
helium	Oxygen Depletion [Asphyxiant]
nitrogen	Oxygen Depletion [Asphyxiant]
1-Butene	**ACGIH TLV (United States, 1/2009).** TWA: 250 ppm 8 hour(s).
Isobutylene	**ACGIH TLV (United States, 1/2009).** TWA: 250 ppm 8 hour(s).
propylene	**ACGIH TLV (United States, 1/2009).** TWA: 500 ppm 8 hour(s).
argon	Oxygen Depletion [Asphyxiant]
1,3-butadiene	**ACGIH (United States).** TWA: 2 ppm 8 hour(s). **OSHA (United States).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 2 ppm 8 hour(s). TWA: 4.4 mg/m³ 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s). **OSHA PEL (United States, 11/2006).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s).
cis-2-Butene	**ACGIH TLV (United States, 1/2009).** TWA: 250 ppm 8 hour(s).
allene	**TLV (Philippines, 1/1978).** TLV: 1800 mg/m³ 8 hour(s). TLV: 1000 ppm 8 hour(s). **Ministry of Labor (Republic of Korea, 6/2008).** STEL: 1250 ppm 15 minute(s). STEL: 2250 mg/m³ 15 minute(s). TWA: 1000 ppm 8 hour(s).

8. Exposure controls/personal protection

	TWA: 1800 mg/m³ 8 hour(s).
(E)-but-2-ene	**ACGIH TLV (United States, 1/2009).** TWA: 250 ppm 8 hour(s).
isopentane	**ACGIH (United States).** TWA: 600 ppm 8 hour(s). **OSHA (United States).** TWA: 1000 ppm 8 hour(s). **NIOSH REL (United States).** TWA: 120 ppm 8 hour(s). CEIL: 610 ppm 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 600 ppm 8 hour(s).
2,2-dimethylpropane	**ACGIH (United States).** TWA: 600 ppm 8 hour(s). **OSHA (United States).** TWA: 1000 ppm 8 hour(s). **NIOSH REL (United States).** TWA: 120 ppm 8 hour(s). CEIL: 610 ppm 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 600 ppm 8 hour(s).
pentane	**ACGIH (United States).** TWA: 600 ppm 8 hour(s). **OSHA (United States).** TWA: 1000 ppm 8 hour(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 600 ppm 8 hour(s). TWA: 1800 mg/m³ 8 hour(s). STEL: 750 ppm 15 minute(s). STEL: 2250 mg/m³ 15 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 120 ppm 10 hour(s). TWA: 350 mg/m³ 10 hour(s). CEIL: 610 ppm 15 minute(s). CEIL: 1800 mg/m³ 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 600 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 1000 ppm 8 hour(s). TWA: 2950 mg/m³ 8 hour(s).
pent-1-ene	**РО МинЗдраСоц ПДК (RU, 2/2004).** CEIL: 300 mg/m³, (as C) Form: vapor and/or gases TWA: 100 mg/m³, (as C) 8 hour(s). Form: vapor and/or gases
2,2-dimethylbutane	**ACGIH (United States).** TWA: 500 ppm 8 hour(s). STEL: 1000 ppm 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 500 ppm 8 hour(s). TWA: 1760 mg/m³ 8 hour(s). STEL: 1000 ppm 15 minute(s). STEL: 3500 mg/m³ 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 500 ppm 8 hour(s). TWA: 1800 mg/m³ 8 hour(s). STEL: 1000 ppm 15 minute(s). STEL: 3600 mg/m³ 15 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 100 ppm 10 hour(s). TWA: 350 mg/m³ 10 hour(s).

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	CEIL: 510 ppm 15 minute(s). CEIL: 1800 mg/m³ 15 minute(s).
2-methylbut-2-ene	**РО МинЗдраСоц ПДК (RU, 2/2004).** CEIL: 300 mg/m³, (as C) Form: vapor and/or gases TWA: 100 mg/m³, (as C) 8 hour(s). Form: vapor and/or gases
3-methylbut-1-ene	**РО МинЗдраСоц ПДК (RU, 2/2004).** CEIL: 300 mg/m³, (as C) Form: vapor and/or gases TWA: 100 mg/m³, (as C) 8 hour(s). Form: vapor and/or gases
benzene	**ACGIH (United States). Absorbed through skin.** TWA: 0.5 ppm 8 hour(s). STEL: 2.5 ppm 15 minute(s). **OSHA (United States).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s). **ACGIH TLV (United States, 2/2010). Absorbed through skin.** TWA: 0.5 ppm 8 hour(s). TWA: 1.6 mg/m³ 8 hour(s). STEL: 2.5 ppm 15 minute(s). STEL: 8 mg/m³ 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s). **OSHA PEL Z2 (United States, 11/2006).** TWA: 10 ppm 8 hour(s). CEIL: 25 ppm AMP: 50 ppm 10 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 0.1 ppm 10 hour(s). STEL: 1 ppm 15 minute(s). **OSHA PEL (United States, 6/2010).** TWA: 1 ppm 8 hour(s). STEL: 5 ppm 15 minute(s).
heptane	**ACGIH (United States).** TWA: 400 ppm 8 hour(s). STEL: 500 ppm 15 minute(s). **OSHA (United States).** TWA: 500 ppm 8 hour(s). **ACGIH TLV (United States, 1/2009).** TWA: 400 ppm 8 hour(s). TWA: 1640 mg/m³ 8 hour(s). STEL: 500 ppm 15 minute(s). STEL: 2050 mg/m³ 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 400 ppm 8 hour(s). TWA: 1600 mg/m³ 8 hour(s). STEL: 500 ppm 15 minute(s). STEL: 2000 mg/m³ 15 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 85 ppm 10 hour(s). TWA: 350 mg/m³ 10 hour(s). CEIL: 440 ppm 15 minute(s). CEIL: 1800 mg/m³ 15 minute(s). **OSHA PEL (United States, 11/2006).** TWA: 500 ppm 8 hour(s). TWA: 2000 mg/m³ 8 hour(s).
n-hexane	**ACGIH (United States). Absorbed through skin.** TWA: 50 ppm 8 hour(s). **OSHA (United States).** TWA: 500 ppm 8 hour(s).

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	OSHA PEL 1989 (United States, 3/1989). TWA: 50 ppm 8 hour(s). TWA: 180 mg/m³ 8 hour(s). **NIOSH REL (United States, 6/2009).** TWA: 50 ppm 10 hour(s). TWA: 180 mg/m³ 10 hour(s). **ACGIH TLV (United States, 1/2009). Absorbed through skin.** TWA: 50 ppm 8 hour(s). **OSHA PEL (United States, 11/2006).** TWA: 500 ppm 8 hour(s). TWA: 1800 mg/m³ 8 hour(s).
toluene	**ACGIH (United States). Absorbed through skin.** TWA: 20 ppm 8 hour(s). **OSHA (United States).** TWA: 200 ppm 8 hour(s). CEIL: 300 ppm 15 minute(s). PEAK: 500 ppm, 1 times per shift, 10 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm 8 hour(s). TWA: 375 mg/m³ 8 hour(s). STEL: 150 ppm 15 minute(s). STEL: 560 mg/m³ 15 minute(s). **OSHA PEL Z2 (United States, 11/2006).** TWA: 200 ppm 8 hour(s). CEIL: 300 ppm AMP: 500 ppm 10 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 100 ppm 10 hour(s). TWA: 375 mg/m³ 10 hour(s). STEL: 150 ppm 15 minute(s). STEL: 560 mg/m³ 15 minute(s). **ACGIH TLV (United States, 1/2009).** TWA: 20 ppm 8 hour(s).
trans-pent-2-ene	**РО МинЗдраСоц ПДК (RU, 2/2004).** CEIL: 300 mg/m³, (as C) Form: vapor and/or gases TWA: 100 mg/m³, (as C) 8 hour(s). Form: vapor and/or gases

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : 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.

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.

Personal protection

8. Exposure controls/personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. If operating conditions cause high gas concentrations to be produced or any recommended or statutory exposure limit is exceeded, use an air-fed respirator or self-contained breathing apparatus. The gas can cause asphyxiation without warning by replacing the oxygen in the air. 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.
A respiratory protection program that meet OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus.

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.

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. Select in accordance with OSHA 29 CFR 1910.133.

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. Metatarsal shoes for cylinder handling Select in accordance with OSHA 29 CFR 1910.132 and 1910.133.

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.

9. Physical and chemical properties

Physical state : Gas.
Flash point : Not available.
Burning time : Not applicable.
Burning rate : Not applicable.
Auto-ignition temperature : Not available.
Flammable limits : Not available.
Color : Colorless.
Odor : Not available.
Taste : Not available.
Molecular weight : Not applicable.
Molecular formula : Not applicable.
pH : Not available.
Boiling/condensation point : Not available.
Melting/freezing point : Not available.
Critical temperature : Not available.
Relative density : Not available.
Vapor pressure : Not available.
Vapor density : Not available.
Volatility : Not available.
Odor threshold : Not available.
Evaporation rate : Not available.

9. Physical and chemical properties

Solubility : Not available.

COEFFICIENT OF WATER/OIL DISTRIBUTION: : Not available.

10. Stability and reactivity

Chemical stability : The product is stable.

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. Do not allow gas to accumulate in low or confined areas. Avoid exposure - obtain special instructions before use.

Materials to avoid : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Isobutylene	LC50 Inhalation Vapor	Rat	550000 mg/m3	4 hours
isobutane	LC50 Inhalation Vapor	Rat	658000 mg/m3	4 hours
	LC50 Inhalation Gas.	Rat	57 pph	15 minutes
carbon monoxide	TDLo Intraperitoneal	Rat	35 mL/kg	-
	LC50 Inhalation Vapor	Rat	13500 mg/m3	15 minutes
	LC50 Inhalation Vapor	Rat	1900 mg/m3	4 hours
	LC50 Inhalation Gas.	Rat	6600 ppm	30 minutes
	LC50 Inhalation Gas.	Rat	3760 ppm	1 hours
	LC50 Inhalation Gas.	Rat	1807 ppm	4 hours
carbon dioxide	LC50 Inhalation Gas.	Rat	470000 ppm	30 minutes
butane	LC50 Inhalation Vapor	Rat	658 g/m3	4 hours
1,3-butadiene	LD50 Oral	Rat	5480 mg/kg	-
	LC50 Inhalation Vapor	Rat	285 g/m3	4 hours
	LC50 Inhalation Vapor	Rat	285000 mg/m3	4 hours
	LC50 Inhalation Gas.	Rat	220000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	128000 ppm	4 hours
pentane	LD50 Oral	Rat	>2000 mg/kg	-
	LC50 Inhalation Vapor	Rat	364 g/m3	4 hours
2,2-dimethylpropane	LC50 Inhalation Vapor	Mouse	178109 ppm	1 hours
isopentane	LC50 Inhalation Vapor	Rat	280000 mg/m3	4 hours

11. Toxicological information

pent-1-ene	LC50 Inhalation Vapor	Rat	175000 mg/m3	4 hours
benzene	LD50 Dermal	Rabbit	>9400 uL/kg	-
	LD50 Intraperitoneal	Rat	1100 ug/kg	-
	LD50 Oral	Rat	1 mL/kg	-
	LD50 Oral	Rat	35000 mg/kg	-
	LD50 Oral	Rat	6400 mg/kg	-
	LD50 Oral	Rat	1800 mg/kg	-
	LD50 Oral	Rat	930 mg/kg	-
	LDLo Subcutaneous	Rat	5 mg/kg	-
	TDLo Dermal	Rat	0.92 mL/kg	-
	TDLo Dermal	Rat	0.08 mL/kg	-
	TDLo Oral	Rat	1280 mg/kg	-
	TDLo Oral	Rat	320 mg/kg	-
	LC50 Inhalation Vapor	Rat	32000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	10000 ppm	7 hours
heptane	LC50 Inhalation Vapor	Rat	103 g/m3	4 hours
	LC50 Inhalation Gas.	Rat	42902 ppm	1 hours
n-hexane	LD50 Oral	Rat	25 g/kg	-
	LDLo Intraperitoneal	Rat	9100 mg/kg	-
	TDLo Oral	Rat	20000 mg/kg	-
	LC50 Inhalation Vapor	Rat	627000 mg/m3	3 minutes
	LC50 Inhalation Gas.	Rat	48000 ppm	4 hours
toluene	LD50 Dermal	Rabbit	14100 uL/kg	-
	LD50 Intraperitoneal	Rat	1332 mg/kg	-
	LD50 Intravenous	Rat	1960 mg/kg	-
	LD50 Oral	Rat	636 mg/kg	-
	LD50 Unreported	Rat	6900 mg/kg	-
	LDLo Intraperitoneal	Rat	2.5 mL/kg	-
	TDLo Dermal	Rat	26.4 mg/kg	-
	TDLo Intraperitoneal	Rat	1 g/kg	-
	TDLo Intraperitoneal	Rat	900 mg/kg	-
	TDLo Intraperitoneal	Rat	750 mg/kg	-
	TDLo Intraperitoneal	Rat	600 mg/kg	-
	TDLo Oral	Rat	1200 mg/kg	-
	TDLo Oral	Rat	1000 mg/kg	-
	TDLo Oral	Rat	800 mg/kg	-
	TDLo Oral	Rat	400 mg/kg	-
	LC50 Inhalation Vapor	Rat	49 g/m3	4 hours
	LC50 Inhalation Vapor	Rat	56976 ppm	1 hours

Conclusion/Summary : Not available.

Chronic toxicity

11. Toxicological information

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitizer

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
ethylene	A4	3	-	-	-	-
Isobutylene	A4	-	-	-	-	-
propylene	A4	3	-	-	-	-
1,3-butadiene	A2	1	B	+	Proven.	-
benzene	A1	1	A	+	Proven.	+
heptane	-	-	D	-	-	-
toluene	A4	3	D	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12. Ecological information

Ecotoxicity : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
benzene	-	Acute EC50 98800 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp. - Nauplii	48 hours
	-	Acute EC50 58400 to 82300 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp. - Nauplii	48 hours
	-	Acute EC50 22000 to 29500 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute EC50 11730 to 15600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute EC50 10000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	-	Acute EC50 9230 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 9.2 to	Fish - Rainbow	96 hours

12. Ecological information

		11.7 mg/L Fresh water	trout,donaldson trout - Oncorhynchus mykiss - 2.4 g	
	-	Acute LC50 35 to 43.8 ppm Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio - Adult	48 hours
	-	Acute LC50 >347000 ug/L Marine water	Crustaceans - Dungeness or edible crab - Cancer magister - Zoea	48 hours
	-	Acute LC50 139000 to 187000 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp. - Nauplii	48 hours
	-	Acute LC50 120000 ug/L Fresh water	Crustaceans - Aquatic sowbug - Asellus aquaticus	48 hours
	-	Acute LC50 99200 to 122600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 97800 to 124000 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp. - Nauplii	48 hours
	-	Acute LC50 96200 to 134100 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 76900 to 114100 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 59600 to 80700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 35000 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	-	Acute LC50 33000 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	-	Acute LC50 21000 ug/L Marine water	Crustaceans - Brine shrimp - Artemia salina - Nauplii	48 hours
	-	Acute LC50 5900 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours

12. Ecological information

	-	Acute LC50 5300 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling) - 106 mm - 13.9 g	96 hours
	-	Acute LC50 10.9 ul/L Marine water	Fish - Striped bass - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling) - 52 mm - 1.5 g	96 hours
	-	Acute LC50 10.76 to 12.04 ul/L Fresh water	Fish - Sockeye salmon - Oncorhynchus nerka - Smolt - 2 years - 75 mm	96 hours
	-	Acute LC50 9.8 ul/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus kisutch - FRY	96 hours
	-	Acute LC50 8.47 to 9.09 ul/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha - FRY	96 hours
	-	Acute LC50 5.8 ul/L Marine water	Fish - Striped bass - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling) - 6 g	96 hours
	-	Acute LC50 5.55 to 8.21 ul/L Marine water	Fish - Sockeye salmon - Oncorhynchus nerka - Smolt - 2 years - 75 mm	96 hours
	-	Acute LC50 5.28 ul/L Fresh water	Fish - Pink salmon - Oncorhynchus gorbuscha - FRY	96 hours
	-	Chronic NOEC <13000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <=24 hours	48 hours
heptane	-	Acute LC50 4924000 ug/L Fresh water	Fish - Western mosquitofish - Gambusia affinis - Adult	96 hours
	-	Acute LC50 375000 ug/L Fresh water	Fish - Mozambique tilapia - Tilapia mossambica - 99 mm - 10 g	96 hours

12. Ecological information

n-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
toluene	-	Acute EC50 19600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - LARVAE	48 hours
	-	Acute EC50 6880 to 9830 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute EC50 6780 to 7810 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling) - 54 mm - 2.187 g	96 hours
	-	Acute EC50 6000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Juvenile (Fledgling, Hatchling, Weanling)	48 hours
	-	Acute LC50 15.5 ppm Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio - Adult	48 hours
	-	Acute LC50 310000 to 420000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <=24 hours	48 hours
	-	Acute LC50 170000 ug/L Marine water	Crustaceans - Dungeness or edible crab - Cancer magister - Zoea	48 hours
	-	Acute LC50 97700 to 174700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 86300 to 174700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - Neonate - <=24 hours	48 hours
	-	Acute LC50 15500 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours

12. Ecological information

-	Acute LC50 9360 ug/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus kisutch - FRY - >90 days	96 hours
-	Acute LC50 8110 ug/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus kisutch - 0.3 g	96 hours
-	Acute LC50 8090 to 8780 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha - FRY - 3.5 cm - 0.35 g	96 hours
-	Acute LC50 7630 to 8480 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha - FRY - 3.5 cm - 0.35 g	96 hours
-	Acute LC50 6780 to 7810 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss - Juvenile (Fledgling, Hatchling, Weanling) - 54 mm - 2.187 g	96 hours
-	Acute LC50 6410 to 7180 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha - FRY - 3.5 cm - 0.35 g	96 hours
-	Acute LC50 5800 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
-	Acute LC50 5500 ug/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus kisutch - FRY - 1 g	96 hours
-	Acute LC50 7.3 ul/L Marine water	Fish - Striped bass - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling) - 6 g	96 hours
-	Chronic NOEC 28000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <=24 hours	48 hours

Conclusion/Summary : Not available.

Persistence/degradability

12. Ecological information

Conclusion/Summary : Not available.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. 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. Do not puncture or incinerate container. Empty pressure vessels should be returned to the supplier.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN1954	Compressed gas, flammable, n.o.s. (hydrogen, Methane)	2.1	-		-

PG* : Packing group

15. Regulatory information

HCS Classification : Flammable gas
Compressed gas
Toxic material
Carcinogen
Target organ effects

U.S. Federal regulations : **TSCA 4(a) final test rules**: heptane; pentane
TSCA 8(a) PAIR: heptane; pentane
TSCA 8(a) IUR: argon; carbon dioxide; nitrogen; hydrogen
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: acetylene; butane; carbon dioxide; carbon monoxide; ethane; ethylene; isobutane; Methane; propane; helium; hydrogen
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: acetylene: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard; butane: Fire hazard, Sudden release of pressure; carbon dioxide: Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard; carbon monoxide: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard; ethane: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard; ethylene: Fire hazard, reactive, Sudden release of pressure, Delayed (chronic) health hazard; isobutane: Fire hazard, Sudden release of pressure; Methane: Fire hazard, Sudden release of pressure; propane: Fire hazard, Sudden release of pressure; helium: Sudden release of pressure; hydrogen: Fire hazard, Sudden release of pressure

Clean Water Act (CWA) 307: benzene; toluene

Clean Water Act (CWA) 311: benzene; toluene

15. Regulatory information

Clean Air Act (CAA) 112 accidental release prevention: 1-Butene; pent-1-ene; 3-methylbut-1-ene; acetylene; butane; cis-2-Butene; ethane; ethylene; isobutane; Isobutylene; isopentane; Methane; 2,2-dimethylpropane; pentane; allene; propane; propylene; (E)-but-2-ene; trans-pent-2-ene; hydrogen

Clean Air Act (CAA) 112 regulated flammable substances: 1-Butene; pent-1-ene; 3-methylbut-1-ene; acetylene; butane; cis-2-Butene; ethane; ethylene; isobutane; Isobutylene; isopentane; Methane; 2,2-dimethylpropane; pentane; allene; propane; propylene; (E)-but-2-ene; trans-pent-2-ene; hydrogen

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not 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 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	ethylene	74-85-1	2
	propylene	115-07-1	0.5
	1,3-butadiene	106-99-0	0.2
Supplier notification :	ethylene	74-85-1	2
	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: HYDROGEN; HELIUM; PROPANE; METHANE; ISOBUTANE; ETHYLENE; ETHANE; CARBON MONOXIDE; CARBON DIOXIDE; BUTANE; ACETYLENE
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: HYDROGEN; HELIUM; PROPANE; METHANE; Isobutane; PROPANE, 2-METHYL-; ETHYLENE; ETHENE; ETHANE; CARBON MONOXIDE; CARBON DIOXIDE; CARBONIC ACID GAS; BUTANE; ACETYLENE; ETHYNE; 1,3-BUTADIENE; BIETHYLENE
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: hydrogen; helium; propane; Methane; isobutane; ethylene; ethane; carbon monoxide; carbon dioxide; butane; acetylene; 1,3-butadiene

15. Regulatory information

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 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.
benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)

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

Canada inventory : All components are listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: Not determined.
China inventory (IECSC): Not determined.
Japan inventory: Not determined.
Korea inventory: Not determined.
New Zealand Inventory of Chemicals (NZIoC): Not determined.
Philippines inventory (PICCS): All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

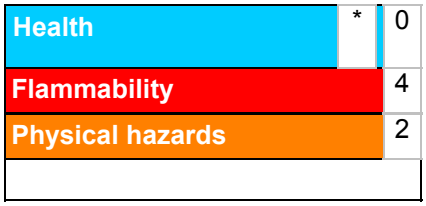
Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

16. Other information

Label requirements : FLAMMABLE HIGH PRESSURE GAS. CAN FORM EXPLOSIVE MIXTURES WITH AIR.HARMFUL IF INHALED.GAS REDUCES OXYGEN AVAILABLE FOR BREATHING. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CAN CAUSE TARGET ORGAN DAMAGE.May cause liver, kidney, nervous system and respiratory system damage.May cause heart disturbances.CAN INCREASE RESPIRATION. CANCER HAZARD - CAN CAUSE CANCER. Can cause damage to blood forming tissues.REPRODUCTIVE HAZARD. SYMPTOMS MAY BE DELAYED.

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



***An Asterisk used in conjuction whith HMIS health hazards ratings designates a carcinogenic or reproductive hazard.**

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 MSDSs 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.) :

References : AV-1 Safe Handling and Storage of Compressed Gas
P-1 Safe Handling of Compressed Gases in Containers
P-14 Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmosphere
SB-2 Oxygen-Deficient Atmospheres
V-1 Compressed Gas Cylinder Valve Inlet and Outlet Connections
V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures
--- Handbook of Compressed Gases, Fifth Edition

Date of printing : **1/15/2014.**

Date of issue : 1/15/2014.

Date of previous issue : No previous validation.

Version : 0.01

Indicates information that has changed from previously issued version.

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.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-350

PIN-INDEXED YOKE: Not applicable.

ULTRA-HIGH-INTEGRITY CONNECTION: Not applicable.

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, Fax: (703) 934-1830, website: www.cganet.com.

Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

16. Other information

MIXTURES:

When two or more gases, or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist, or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

For more in-depth information for each component, refer to the pure product MSDS.

The information contained in this MSDS is generated from technical sources using the Chemmate Mixture MSDS system and the pure-product MSDS for each component. These mixtures are not tested as a whole for chemical, physical, or health effects.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

Praxair MSDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current Praxair MSDSs for these products, contact your Praxair sales representative or local distributor or supplier. If you have questions regarding Praxair MSDSs, would like the form number and date of the latest MSDS, or would like the names of the Praxair suppliers in your area, phone or write the Praxair Call Center (Phone: 1-800-PRAXAIR; Address: Praxair Call Center, Praxair, Inc., PO Box 44, Tonawanda, NY 14151-0044).

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