

Safety Data Sheet



Division of Fresno Oxygen



Barnes Welding Supply/Barnes Specialty Gases

Division of Fresno Oxygen

2825 S. Elm Ave. #101
Fresno, California 93706
Toll Free: (800) 404-9353
Fax: (559) 233-4206
http://www.barnesweldingsupply.com
E-mail: info@barneswelding.com

Document #: G-282

Emergency Phone:
International

Infotrac 1(800) 535-5053
Infotrac 1(352) 323-3500

Section 1: Product and Company Identification

Barnes Welding Supply / Barnes Specialty Gases - Division of Fresno Oxygen

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Fresno, CA 93706
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(559) 233-4206 Fax
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FOR CHEMICAL EMERGENCIES DURING TRANSPORTATION ONLY CALL INFOTRAC 1-800-535-5053

Product Name: Multigas Mixture bal Methane

Part Number: CS 2700R03Z

Synonyms: UN 1954, Compressed Gas, Flammable, N.O.S., (Hydrogen, Methane), 2.1

Recommended Use: For general analytical/synthetic chemical gas uses.

Usage Restrictions:

Section 2: Hazards Identification



Danger

Hazard Classification:

Aspiration Hazard (Category 1)

Flammable (Category 1)

Gases Under Pressure

Reproductive Toxicity (Category 1A)

Specific target organ toxicity (Repeated Exposure) (Category 1)

Specific target organ toxicity (Single Exposure) (Category 3)

Hazard Statements:

Causes damage to organs through prolonged or repeated exposure

Contains gas under pressure; may explode if heated

Extremely flammable gas

May be fatal if swallowed and enters airways

May cause respiratory irritation

May damage fertility or the unborn child

Toxic to aquatic life with long lasting effects

Precautionary Statements

Prevention:

Wash thoroughly after handling.

[In case of inadequate ventilation] wear respiratory protection.

Do not eat, drink or smoke when using this product.

Do not handle until all safety precautions have been read and understood.

Do not breathe dust/fume/gas/mist/ vapors/spray.

Use only outdoors or in a well-ventilated area.

Wear protective gloves, protective clothing, eye protection and face protection.

Obtain special instructions before use.

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Response:

Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

Immediately call a poison center or doctor.

Eliminate all ignition sources if safe to do so.

Do NOT induce vomiting.

If swallowed: Rinse mouth. Do NOT induce vomiting.

If exposed or concerned: Get medical advice/attention.

If inhaled: Remove person to fresh air and keep comfortable for breathing.

Storage:

Store in a well-ventilated place. Keep container tightly closed.

Protect from sunlight.

Store locked up.

Disposal:

Dispose of contents and/or container in accordance with applicable regulations.

Section 3: Composition/Information on Ingredients

	CAS #	Concentration
iso-Pentane	78-78-4	0.0 - 20%
n-Pentane	109-66-0	0.0 - 20%
Oxygen	7782-44-7	0.0 - 20%
Isobutane	75-28-5	0.0 - 20%
Propane	74-98-6	0.0 - 20%
Carbon Dioxide	124-38-9	0.0 - 20%
Butane	106-97-8	0.0 - 20%
Ethane	74-84-0	0.0 - 20%
Nitrogen	7727-37-9	0.0 - 20%
Carbon Monoxide	630-08-0	0.0 - 20%
Hydrogen	1333-74-0	0.0 - 20%
Hexane	110-54-3	0.0 - 20%
Methane	74-82-8	0.0 - 20%

	Chemical Substance	Chemical Family	Trade Names
iso-Pentane	ISOPENTANE	Hydrocarbons, Aliphatic, Saturated	2-METHYLBUTANE; ETHYLDIMETHYLMETHANE; ISOAMYLHYDRIDE; BUTANE 2-METHYL-; 1,1,2-TRIMETHYLETHANE; C5H12
n-Pentane	N-PENTANE	Hydrocarbons, Aliphatic, Saturated	PENTANE; AMYL HYDRIDE; UN 1265; C5H12
Oxygen	OXYGEN, COMPRESSED GAS	Inorganic gases	OXYGEN; DIOXYGEN; MOLECULAR OXYGEN; OXYGEN MOLECULE; PURE OXYGEN; UN 1072; O2
Isobutane	ISOBUTANE	Hydrocarbons, Aliphatic, Saturated	2-METHYL PROPANE; TRIMETHYL METHANE; UN 1969; C4H10
Propane	PROPANE	Hydrocarbons, Aliphatic, Saturated	N-PROPANE; DIMETHYLMETHANE; PROPYL HYDRIDE; R-290; PROPYLHYDRIDE; LIQUEFIED PETROLEUM GAS; LPG; >99% NATURAL GRADE; >99.9% PURE GRADE; UN 1978; C3H8
Carbon Dioxide	CARBON DIOXIDE, GAS	Inorganic gases	CARBONIC ACID GAS; CARBONIC ANHYDRIDE; CARBON DIOXIDE; CARBON OXIDE; UN 1013; CO2
Butane	BUTANE	Hydrocarbons, Aliphatic, Saturated	N-BUTANE; LIQUEFIED PETROLEUM GAS; NORMAL BUTANE; BUTYL HYDRIDE; LPG; UN 1011; C4H10
Ethane	ETHANE	Hydrocarbons, Aliphatic, Saturated	BIMETHYL; ETHANE, COMPRESSED; METHYLMETHANE, DIMETHYL; ETHYL HYDRIDE; UN 1035; C2H6
Nitrogen	NITROGEN, COMPRESSED GAS	Inorganic gases	DIATOMIC NITROGEN; DINITROGEN; NITROGEN; NITROGEN-14; NITROGEN GAS; UN 1066; N2
Carbon Monoxide	CARBON MONOXIDE	Inorganic gases	CARBON OXIDE; CARBON OXIDE (CO); UN 1016; CO
Hydrogen	HYDROGEN	Inorganic gases	HYDROGEN GAS; HYDROGEN COMPRESSED; HYDROGEN (H2); DIHYDROGEN; UN 1049; H2
Hexane	HEXANE	Hydrocarbons, Aliphatic, Saturated	N-HEXANE; 1-HEXANE; HEXYL HYDRIDE; 1-HEXANE; NORMAL HEXANE; SKELLYSOLVE B; UN 1208; CAPROYL HYDRIDE; C6H14
Methane	METHANE, COMPRESSED GAS	Hydrocarbons, Aliphatic, Saturated	FIRE DAMP; MARSH GAS; METHYL HYDRIDE; NATURAL GAS; METHANE; UN 1971; R50; CH4

Section 4: First Aid Measures

	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
iso-Pentane	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.	None
n-Pentane	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Aspiration hazard. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.	Not available
Oxygen	None expected	None expected	Not likely route of exposure	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.	None
Isobutane	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Propane	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Carbon Dioxide	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Do not induce vomiting.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.

	Skin Contact	Eye Contact	Ingestion	Inhalation	Note to Physicians
Butane	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Not likely route of exposure.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Ethane	If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.	Contact with liquid: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Nitrogen	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Carbon Monoxide	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Hydrogen	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.
Hexane	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.	Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.	Aspiration hazard. DO NOT induce vomiting. If vomiting occurs, keep head lower than hips to help prevent aspiration. Get immediate medical attention. Give artificial respiration if not breathing.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. Long-term exposure to n-hexane can cause damage to the peripheral nervous system.
Methane	Wash exposed skin with soap and water.	Flush eyes with plenty of water.	If a large amount is swallowed, get medical attention.	If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.	For inhalation, consider oxygen.

Section 5: Fire Fighting Measures

	Suitable Extinguishing Media	Products of Combustion	Protection of Firefighters
Iso-Pentane	Foam, dry chemical, carbon dioxide. Water may be ineffective.	Oxides of carbon	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
n-Pentane	Regular dry chemical, carbon dioxide, water, regular foam	Carbon monoxide, carbon dioxide and toxic and irritating fumes	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
Oxygen	Non-flammable. Use extinguishing agent appropriate for the material which is burning. Use water in large quantities for fires involving oxygen.	Oxides of burning material	- Respiratory protection may be needed for frequent or heavy exposure. - None
Isobutane	Carbon dioxide, regular dry chemical Large fires: Flood with fine water spray.	Carbon monoxide, carbon dioxide, water and toxic and irritating fumes	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
Propane	Regular dry chemical, high expansion foam Large fires: Flood with fine water spray.	Carbon monoxide, carbon dioxide, water and toxic and irritating fumes	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
Carbon Dioxide	Non-flammable	Non-flammable	- Any appropriate escape-type, self-contained breathing apparatus. - Non-flammable
Butane	Carbon dioxide, regular dry chemical Large fires: Flood with fine water spray.	Carbon monoxide, carbon dioxide, water and toxic and irritating fumes.	- Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. - Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Ethane	Carbon dioxide, regular dry chemical Large fires: Flood with fine water spray.	Toxic gases	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
Nitrogen	Non-flammable. Use suitable extinguishing media for surrounding fire. Cylinders may rupture or explode if exposed to heat.	Non-flammable	Respiratory protection may be needed for frequent or heavy exposure.
Carbon Monoxide	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon dioxide	- Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply. - Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Hydrogen	Carbon dioxide, regular dry chemical Large fires: Flood with fine water spray.	None known	- Any self-contained breathing apparatus with a full facepiece. - Any self-contained breathing apparatus with a full facepiece.
Hexane	Regular dry chemical, carbon dioxide, water, regular foam Large fires: Use regular foam or flood with fine water spray.	Carbon monoxide, carbon dioxide and toxic and irritating fumes	- Any appropriate escape-type, self-contained breathing apparatus. - Non-flammable
Methane	Carbon dioxide, regular dry chemical Large fires: Use regular foam or flood with fine water spray.	Carbon monoxide, carbon dioxide, water	- Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece. - Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.

Section 6: Accidental Release Measures

	Personal Precautions	Environmental Precautions	Methods for Containment
Iso-Pentane	Keep unnecessary people away, isolate hazard area and deny entry.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
n-Pentane	Keep unnecessary people away, isolate hazard area and deny entry.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Oxygen	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid contact with combustible materials.	Stop leak if possible without personal risk.

	Personal Precautions	Environmental Precautions	Methods for Containment
Isobutane	Keep unnecessary people away, isolate hazard area and deny entry. Do not touch spilled material. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Propane	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Do not touch spilled material.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Carbon Dioxide	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Do not touch spilled material.	Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.	Stop leak if possible without personal risk.
Butane	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Do not touch spilled material.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Ethane	Keep unnecessary people away, isolate hazard area and deny entry. Do not touch spilled material. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Nitrogen	Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas.	No significant effects from contamination expected.	Stop leak if possible without personal risk.
Carbon Monoxide	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition. Keep out of water supplies and sewers.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.
Hydrogen	Keep unnecessary people away, isolate hazard area and deny entry. Do not touch spilled material. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Reduce vapors with water spray. Remove sources of ignition.
Hexane	Keep unnecessary people away, isolate hazard area and deny entry.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray.
Methane	Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering.	Avoid heat, flames, sparks and other sources of ignition.	Stop leak if possible without personal risk. Reduce vapors with water spray. Remove sources of ignition.

	Methods for Cleanup	Other Information
Iso-Pentane	Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal.	None
n-Pentane	Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal.	Not available
Oxygen	Stop leak and ventilate.	None
Isobutane	Contact emergency personnel. Avoid ignition sources.	None
Propane	Contact emergency personnel.	None
Carbon Dioxide	Stop leak, evacuate, remove source of ignition.	None
Butane	Stop leak, evacuate area. Use protective equipment. Contact emergency personnel.	None
Ethane	Contact emergency personnel immediately.	Not available
Nitrogen	N/A	N/A
Carbon Monoxide	Stop leak, evacuate area. Wear protective equipment.	Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
Hydrogen	Stop leak if possible without personal risk.	None
Hexane	Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition.	Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).
Methane	Not available	Not available

Section 7: Handling and Storage

	Handling	Storage
Iso-Pentane	Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125F (52C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.	Do not get liquid in eyes, on skin, or clothing. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Open valve slowly. Close cylinder valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier.
n-Pentane	Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125F (52C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.	Do not get liquid in eyes, on skin, or clothing. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Open valve slowly. Close cylinder valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier.
Oxygen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Isobutane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Propane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Carbon Dioxide	Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards
Butane	Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.110.
Ethane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Nitrogen	Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Carbon Monoxide	Keep separated from incompatible substances.	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.
Hydrogen	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.
Hexane	Store and use with adequate ventilation. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature will not exceed 125F (52C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.	Do not get liquid in eyes, on skin, or clothing. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Open valve slowly. Close cylinder valve after each use; keep closed even when empty. If valve is hard to open, discontinue use and contact your supplier.
Methane	Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101.	Keep separated from incompatible substances.

Section 8: Exposure Controls/Personal Protection

	Exposure Guidelines
Iso-Pentane	ISOPENTANE: 600 ppm ACGIH TWA
n-Pentane	PENTANE: 1000 ppm (2950 mg/m3) OSHA TWA 600 ppm (1770 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 750 ppm (2210 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 600 ppm ACGIH TWA 120 ppm (350 mg/m3) NIOSH recommended TWA 10 hour(s) 610 ppm (1800 mg/m3) NIOSH recommended ceiling 15 min(s)
Oxygen	OXYGEN, COMPRESSED GAS: No occupational exposure limits established
Isobutane	ISOBUTANE: 800 ppm (1900 mg/m3) NIOSH recommended TWA 10 hour(s) LIQUIFIED PETROLEUM GAS (LPG): 1000 ppm (1800 mg/m3) OSHA TWA 1000 ppm ACGIH TWA 1000 ppm (1800 mg/m3) NIOSH recommended TWA 10 hour(s) ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA

	Exposure Guidelines
Propane	PROFANE: 1000 ppm (1800 mg/m3) OSHA TWA 1000 ppm (1800 mg/m3) NIOSH recommended TWA 10 hour(s) LIQUIFIED PETROLEUM GAS (LPG): 1000 ppm (1800 mg/m3) OSHA TWA 1000 ppm ACGIH TWA 1000 ppm (1800 mg/m3) NIOSH recommended TWA 10 hour(s) ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA
Carbon Dioxide	CARBON DIOXIDE: GAS: CARBON DIOXIDE: 5000 ppm (9000 mg/m3) OSHA TWA 10000 ppm (18000 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 30000 ppm (54000 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993) 5000 ppm ACGIH TWA 30000 ppm ACGIH STEL 5000 ppm (9000 mg/m3) NIOSH recommended TWA 10 hour(s) 30000 ppm (54000 mg/m3) NIOSH recommended STEL
Butane	N-BUTANE: 800 ppm (1800 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 800 ppm (1800 mg/m3) NIOSH recommended TWA 10 hour(s) LIQUIFIED PETROLEUM GAS (LPG): 1000 ppm (1800 mg/m3) OSHA TWA 1000 ppm (1800 mg/m3) NIOSH recommended TWA 10 hour(s) ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA
Ethane	TLV-TWA: 1000ppm (Aliphatic hydrocarbon gases: Alkane C1 - C4) (ACGIH)
Nitrogen	NITROGEN, COMPRESSED GAS: NITROGEN: ACGIH (simple asphyxiant)
Carbon Monoxide	CARBON MONOXIDE: 50 ppm (55 mg/m3) OSHA TWA 35 ppm (40 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 200 ppm (229 mg/m3) OSHA ceiling (vacated by 58 FR 35338, June 30, 1993) 25 ppm ACGIH TWA 35 ppm (40 mg/m3) NIOSH recommended TWA 10 hour(s) 200 ppm (229 mg/m3) NIOSH recommended ceiling
Hydrogen	HYDROGEN: ACGIH (simple asphyxiant)
Hexane	N-HEXANE: 500 ppm (1800 mg/m3) OSHA TWA 50 ppm (180 mg/m3) OSHA TWA (vacated by 58 FR 35338, June 30, 1993) 50 ppm ACGIH TWA (skin) 50 ppm (180 mg/m3) NIOSH recommended TWA 10 hour(s)
Methane	METHANE, COMPRESSED GAS: ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA METHANE: No occupational exposure limits established. ALIPHATIC HYDROCARBON GASES ALKANE (C1-C4): 1000 ppm ACGIH TWA

Engineering Controls

Handle only in fully enclosed systems.

	Eye Protection	Skin Protection	Respiratory Protection
iso-Pentane	Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any self-contained breathing apparatus with a full facepiece.
n-Pentane	Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any self-contained breathing apparatus with a full facepiece.
Oxygen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.
Isobutane	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any self-contained breathing apparatus with a full facepiece.
Propane	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any self-contained breathing apparatus with a full facepiece.
Carbon Dioxide	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any appropriate escape-type, self-contained breathing apparatus.
Butane	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any supplied-air respirator with full facepiece and other positive-pressure mode in combination with a separate escape supply.
Ethane	For the gas: Eye protection not required, but recommended. For the liquid: Wear splash resistant safety goggles. Contact lenses should not be worn. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.	Any self-contained breathing apparatus with a full facepiece.
Nitrogen	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure.
Carbon Monoxide	Eye protection not required, but recommended.	Protective clothing is not required.	Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Hydrogen	Eye protection not required, but recommended.	Protective clothing is not required.	Any self-contained breathing apparatus with a full facepiece.
Hexane	Wear splash resistant safety goggles with a face shield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.	Wear appropriate chemical resistant clothing.	Any appropriate escape-type, self-contained breathing apparatus.
Methane	Eye protection not required, but recommended.	Protective clothing is not required.	Respiratory protection may be needed for frequent or heavy exposure. Any self-contained breathing apparatus with a full facepiece.

General Hygiene considerations

- Avoid breathing vapor or mist
- Avoid contact with eyes and skin
- Wash thoroughly after handling and before eating or drinking

Section 9: Physical and Chemical Properties

	Physical State	Appearance	Color	Change in Appearance	Physical Form	Odor	Taste
iso-Pentane	Liquid	Colorless	Colorless	N/A	Liquid	Gasoline like	N/A
n-Pentane	Liquid	Clear	Colorless	N/A	Liquid	Gasoline odor	N/A
Oxygen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless
Isobutane	Gas	Colorless	Colorless	N/A	Gas	Petroleum odor	N/A
Propane	Gas	Clear	Colorless	N/A	Gas	Gasoline odor	N/A
Carbon Dioxide	Gas	Colorless	Colorless	N/A	Gas	Odorless	Acid taste
Butane	Gas	Colorless	Colorless	N/A	Gas	Faint petroleum-like odor	N/A
Ethane	Gas	Colorless	Colorless	N/A	Gas	Sweet odor	N/A
Nitrogen	Gas	Clear	Colorless	N/A	Gas	Odorless	Tasteless
Carbon Monoxide	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Hydrogen	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless
Hexane	Liquid	Clear	Colorless	N/A	Liquid	Faint odor, gasoline odor	N/A
Methane	Gas	Colorless	Colorless	N/A	Gas	Odorless	Tasteless

	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits
iso-Pentane	<-60 F (<-51 C) (CC)	IA	Not available	786 F (420 C)	0.076	0.014
n-Pentane	<-40 F (<-40 C) (CC)	IA	Not available	500 F (260 C)	0.078	0.014
Oxygen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable
Isobutane	-126 F (-88 C) (CC)	Not available	Not available	864 F (462 C)	0.084	0.018
Propane	-157 F (-105 C)	Not available	Not available	842 F (450 C)	0.095	0.021
Carbon Dioxide	Not flammable	Not available	N/A	Nonflammable	Nonflammable	Nonflammable
Butane	-76 F (-60 C) (CC)	Not available	630.96 (log = 2.80) (estimated from water solubility)	549 F (287 C)	0.085	0.019
Ethane	-211 F (-135 C) (CC)	Not available	912.01 (log = 2.97) (estimated from water solubility)	882 F (472 C)	0.125	0.03
Nitrogen	Not flammable	Not available	Not available	Nonflammable	Nonflammable	Nonflammable
Carbon Monoxide	Flammable	Not available	1478.11 (log = 3.17) (estimated from water solubility)	1128-1202 F (609-650 C)	0.74	12.0-12.5%

	Flash Point	Flammability	Partition Coefficient	Autoignition Temperature	Upper Explosive Limits	Lower Explosive Limits
Hydrogen	Flammable gas (burns at all ambient temperatures)	Not available	Not available	752 F (400 C)	0.75	0.04
Hexane	-9.4 F (-23 C) (CC); -7 F (-21.7 C) (CC)	IB	139315.68 (log = 5.148) (estimated from water solubility)	437 F (225 C)	0.075	0.011
Methane	-369 F (-223 C)	Not available	724.44 (log = 2.87) (estimated from water solubility)	999 F (537 C)	15%	5%

	Boiling Point	Freezing Point	Vapor Pressure	Vapor Density	Specific Gravity	Water Solubility	pH	Odor Threshold	Evaporation Rate	Viscosity
iso-Pentane	82 F (28 C)	-256 F (-160 C)	Not available	2.5 (Air=1)	0.6201	Insoluble	Not available	Not available	Not available	Not available
n-Pentane	98.93 F (36.07 C)	-201.5 F (-129.7 C)	400 mmHg @ 18.5 C	2.5 (Air=1)	0.626	0.0004	Not available	2.2-5000 ppm	28.8 (butyl acetate=1)	<32 SUS
Oxygen	-297 F (-183 C)	-360 F (-218 C)	760 mmHg @ -183 C	1.1 (Air=1)	Not applicable	3.2% @ 25 C	Not applicable	Not available	Not applicable	0.02075 cP @ 25 C
Isobutane	10 F (-12 C)	-254 F (-159 C)	3.1 atm @ 21 C	2 (Air=1)	0.549 @ 20 C	Slightly soluble	Not applicable	Not available	Not applicable	0.0077 cP @ 25 C
Propane	-40 F (-40 C)	-310 F (-190 C)	6398 mmHg @ 21.1 C	1.55 (Air=1)	0.5853 @ -45 C	Very slightly soluble	Not applicable	5000-20000 ppm	Not applicable	Not available
Carbon Dioxide	Not available	-71 F (-57 C) @ 4000 mmHg	43700 mmHg @ 21 C	1.5 (Air=1)	1.522 @ 21 C	Soluble	3.7 (saturated aqueous solution) @ 101.3 kPa (carbonic acid)	Not available	Not applicable	0.01657 cP @ 0 C
Butane	30 F (-1 C)	-216 F (-138 C)	1557 mmHg @ 20 C	2.1 (Air=1)	0.5788 @ 0 C	0.15	Not applicable	6.16 ppm	Not applicable for gas. Liquefied n-butane will evaporate rapidly at room temperature	Not available
Ethane	-128 F (-89 C)	-297 F (-183 C)	28842 mmHg @ 21 C	1.05 (Air =1)	Not applicable	4.7% @ 20 C	Not applicable	899 ppm	Not applicable for gas. Refrigerated liquefied ethane will evaporate rapidly at room temperature	0.00852 cP @ 0 C
Nitrogen	-321 F (-196 C)	-346 F (-210 C)	760 mmHg @ -196 C	0.967 (Air=1)	Not applicable	1.6% @ 20 C	Not applicable	Not available	Not applicable	0.01787 cP @ 27 C
Carbon Monoxide	-312.7 F (-191.5 C)	-326 F (-199 C)	760 mmHg @ -191 C gas; cannot be liquefied at room temperature	0.968 (Air=1)	Not applicable	2.3% @ 20 C	Not applicable	Not available	Not applicable	0.01657 cP @ 0 C
Hydrogen	-423 F (-253 C)	-434 F (-259 C)	760 mmHg @ -253 C	0.07 (Air=1)	Not applicable	1.82% @ 20 C	Not applicable	Not available	Not applicable	0.008957 cP @ 26.8 C
Hexane	156 F (69 C)	-139 F (-95 C)	124 mmHg @ 20 C	3 (Air=1)	0.6603	0.014% @ 20 C	Neutral	64-244 ppm	8.9 (n-butyl acetate = 1)	0.32 cP @ 25 C
Methane	-260 F (-162 C)	-297 F (-183 C)	760 mmHg @ -161 C	0.555 (Air=1)	Not applicable	3.5% @ 17 C	Not applicable	Not available	Not applicable	0.01118 cP @ 27 C

	Molecular Weight	Molecular Formula	Density	Weight per Volume	Volatility by Volume	Volatility	Solvent Solubility
iso-Pentane	72.15	C-H3-C-H2-C-H-(C-H)2	Not available	Not available	100%	Not available	Ether, alcohol, hydrocarbons, oils
n-Pentane	72.15/mol	C5-H12	Not available	Not available	Not available	Not available	Soluble: Alcohol, ether, acetone, benzene, chloroform
Oxygen	31.9988	O2	1.309 g/L @ 25 C	Not available	Not applicable	Not applicable	Soluble: Alcohol
Isobutane	58.12	C4-H10	Not available	Not available	100%	Not applicable	Soluble: Alcohol, ether, chloroform
Propane	44.11	C-H3-C-H2-C-H3	0.116	Not available	Not available	Not applicable	Soluble: Absolute alcohol, ether, chloroform, benzene, turpentine
Carbon Dioxide	44.01	C-O2	0.114	Not available	Not applicable	Not applicable	Soluble: Alcohol, acetone, hydrocarbons, organic solvents
Butane	58.12	C-H3-C-(H)2-C-H3	Not available	Not available	100%	Not applicable	Soluble: Alcohol, ether, chloroform
Ethane	30.07	C-H3-C-H3	1.242 g/L @ 25 C	Not available	Not available	1	Soluble: Benzene, ethanol
Nitrogen	28.0134	N2	1.2506 g/L	Not available	100%	1	Soluble: Liquid ammonia
Carbon Monoxide	28.01	C-O	1.250 g/L @ 0 C	Not available	100%	Not applicable	Soluble: Alcohol, benzene, acetic acid, ethyl acetate, chloroform, cuprous chloride solutions
Hydrogen	2	H2	0.08987 g/L @ 0 C	Not available	Not available	Not applicable	Soluble: Not available
Hexane	86.18	C-H3-C-(H)4-C-H3	Not available	Not available	Not available	675 g/l VOC (w/v)	Soluble: Alcohol, ether, chloroform, acetone, organic solvents
Methane	16.04	C-H4	0.717 g/L @ 0 C	Not available	Not applicable	Not applicable	Soluble: Alcohol, ether, benzene, organic solvents

Section 10: Stability and Reactivity

	Stability	Conditions to Avoid	Incompatible Materials
iso-Pentane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials
n-Pentane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, combustible materials, halogen compounds
Oxygen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, halo carbons, metals, bases, reducing agents, amines, metal salts, oxidizing materials, alkaline earth and alkali metals
Isobutane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogen compounds
Propane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, combustible materials, halogen compounds,
Carbon Dioxide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Combustible materials, oxidizing materials, metal salts, reducing agents, metal carbide, metals, bases
Butane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogen compounds
Ethane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogens,
Nitrogen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Metals, oxidizing materials
Carbon Monoxide	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogens, metal oxides, metals, combustible materials, lithium
Hydrogen	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Metals, oxidizing materials, metal oxides, combustible materials, halogens, metal salts, halo carbons, nitrogen trifluoride, oxygen difluoride, magnesium and calcium carbonate, sodium, potassium
Hexane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Oxidizing materials, halogens, combustible materials, chlorine dioxide, fluorine, nitrogen dioxide, potassium chlorate, chlorine, chlorosulfuric acid

	Stability	Conditions to Avoid	Incompatible Materials
Methane	Stable at normal temperatures and pressure.	Stable at normal temperatures and pressure.	Halogens, oxidizing materials, combustible materials

	Hazardous Decomposition Products	Possibility of Hazardous Reactions
iso-Pentane	Oxides of carbon	Will not polymerize.
n-Pentane	Oxides of carbon	Will not polymerize.
Oxygen	Miscellaneous decomposition products	Will not polymerize.
Isobutane	Oxides of carbon	Will not polymerize.
Propane	Oxides of carbon	Will not polymerize.
Carbon Dioxide	Carbon monoxide	Will not polymerize.
Butane	Oxides of carbon	Will not polymerize.
Ethane	Oxides of carbon	Will not polymerize.
Nitrogen	Oxides of nitrogen	Will not polymerize.
Carbon Monoxide	Oxides of carbon	Will not polymerize.
Hydrogen	Miscellaneous decomposition products	Will not polymerize.
Hexane	Oxides of carbon	Will not polymerize.
Methane	Oxides of carbon	Will not polymerize.

Section 11: Toxicology Information

Acute Effects	Oral LD50	Dermal LD50	Inhalation
iso-Pentane	Not available	Not available	Irritation, difficulty breathing, symptoms of drunkenness
n-Pentane	>2000 mg/kg oral-rat LD50	Not available	Irritation, nausea, difficulty breathing, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, central nervous system depression, asphyxiant
Oxygen	Not established	Not established	Irritation, changes in body temperature, nausea, difficulty breathing, irregular heartbeat, dizziness, disorientation, hallucinations, mood swings, pain in extremities, tremors, lung congestion, convulsions
Isobutane	LC50, 1 hr, rat = 285,000 ppmv	Not available	Irritation, nausea, vomiting, headache, symptoms of drunkenness, suffocation, convulsions, coma
Propane	LC50 Inhalation Gas. Rat >800000 ppm 15 minutes	Not available	Central nervous system depression, difficulty breathing, nausea, vomiting, irregular heartbeat, headache, symptoms of drunkenness, disorientation, suffocation, convulsions, coma
Carbon Dioxide	Not established	Not established	Ringling in the ears, nausea, irregular heartbeat, headache, drowsiness, dizziness, tingling sensation, visual disturbances, suffocation, convulsions, coma
Butane	LC(50): 656 mg/l (270,000 ppm) butane (4 hour-rat)	Not established	Irritation, nausea, vomiting, headache, drowsiness, symptoms of drunkenness, tingling sensation, suffocation, convulsions, coma, can displace oxygen at high concentrations
Ethane	Not available	Not available	Irritation, nausea, vomiting, irregular heartbeat, headache, dizziness, disorientation, emotional disturbances, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma
Nitrogen	Not available	Not available	Nausea, vomiting, difficulty breathing, headache, drowsiness, dizziness, tingling sensation, loss of coordination, convulsions, coma
Carbon Monoxide	LC50 Inhalation Gas. Rat 1807 ppm 4 hours	Not available	Changes in body temperature, changes in blood pressure, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, disorientation, hallucinations, pain in extremities, tremors, loss of coordination, hearing loss, visual disturbances, eye damage, suffocation, blood disorders, convulsions, coma
Hydrogen	Not available	Not available	Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, convulsions, unconsciousness, coma
Hexane	>5 gm/kg oral-rat LD50	>2 gm/kg skin-rabbit LD50	Irritation, nausea, irregular heartbeat, headache, drowsiness, dizziness, mood swings, loss of coordination, lung congestion, nerve damage, brain damage, unconsciousness
Methane	Not available	Not available	Nausea, vomiting, difficulty breathing, irregular heartbeat, headache, drowsiness, fatigue, dizziness, disorientation, mood swings, tingling sensation, loss of coordination, suffocation, convulsions, unconsciousness, coma

	Eye Irritation	Skin Irritation	Sensitization
iso-Pentane	Irritation	Irritation	Aspiration hazard, Category 1; H304: May be fatal if swallowed and enters airways. Specific Target Organ Toxicity (single exposure), Category 3; H336: May cause drowsiness or dizziness. Hazardous to the aquatic environment, Chronic Category 2; H411: Toxic to aquatic life with long lasting effects.
n-Pentane	Irritation	Irritation	Specific Target Organ Toxicity (single exposure), Category 3; H336: May cause drowsiness or dizziness. Aspiration hazard, Category 1; H304: May be fatal if swallowed and enters airways.
Oxygen	No information on significant adverse effects	No information on significant adverse effects	No significant target effects reported.
Isobutane	Liquid: frostbite, blurred vision	Liquid: blisters, frostbite	Respiratory tract irritation, central nervous system depression, difficulty breathing
Propane	Liquid: frostbite, blurred vision	Liquid: blisters, frostbite	No health hazards classified.
Carbon Dioxide	Irritation, frostbite, blurred vision	Liquid: blisters, frostbite	Difficulty breathing
Butane	Frostbite, blurred vision	Blisters, frostbite	Central nervous system depression, difficulty breathing
Ethane	Frostbite	Frostbite	Difficulty breathing
Nitrogen	Contact with rapidly expanding gas may cause burns or frostbite	No information on significant adverse effects	Difficulty breathing
Carbon Monoxide	No information on significant adverse effects	No information on significant adverse effects	Acute toxicity, Category 3, inhalation: H331: Toxic if inhaled. Reproductive toxicity, Category 1A; H360D: May damage the unborn child. Specific Target Organ Toxicity (repeated exposure), Category 1; H372: Causes damage to organs through prolonged or repeated exposure.
Hydrogen	Not irritating	Not irritating	Difficulty breathing
Hexane	Mild irritation	Irritation	Reproductive toxicity, Category 2; H361F: Suspected of damaging fertility. Aspiration hazard, Category 1; H304: May be fatal if swallowed and enters airways. Specific Target Organ Toxicity (repeated exposure), Category 2; H373: May cause damage to organs through prolonged or repeated exposure. Skin irritation, Category 2; H315: Causes skin irritation. Specific Target Organ Toxicity (single exposure), Category 3; H336: May cause drowsiness or dizziness. Hazardous to the aquatic environment, Chronic Category 2; H411: Toxic to aquatic life with long lasting effects.
Methane	No information on significant adverse effects	No information on significant adverse effects	Difficulty breathing

Chronic Effects	Carcinogenicity	Mutagenicity	Reproductive Effects	Developmental Effects
iso-Pentane	Not available	Not available	Not available	No data
n-Pentane	Not available	Not available	Not available	No data
Oxygen	Not known	Available	Available	No data
Isobutane	Not available	Not available	Not available	No data
Propane	Not available	Not available	Not available	No data
Carbon Dioxide	Not available	Not established	Available	No data
Butane	None	Not established	Not established	No data
Ethane	Not listed	Not available	Not available	No data
Nitrogen	Not hazardous	Not available	Not available	No data
Carbon Monoxide	Not available	Available	Available	No data
Hydrogen	Not available	Not available	Not available	No data
Hexane	Not listed	Available	Available	No data
Methane	Not available	Not available	Not available	No data

Section 12: Ecological Information

Fate and Transport	Eco toxicity	Persistence / Degradability	Bioaccumulation / Accumulation	Mobility in Environment
iso-Pentane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
n-Pentane	Fish toxicity: Not available Invertebrate toxicity: 3000000 ug/L 48 week(s) (Mortality) Pacific oyster (Crassostrea gigas) Algal toxicity: 1000 ug/L 8 year(s) EC50 (Photosynthesis) Algae, phytoplankton, algal mat (Algae) Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
Oxygen	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Low bioaccumulation	Not available
Isobutane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
Propane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
Carbon Dioxide	Fish toxicity: 150000 ug/L 48 day(s) (Mortality) Brown trout (Salmo trutta) Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Moderately volatile from water.	Accumulates very little in the bodies of living organisms.	Leaches through the soil
Butane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Expected to exist entirely in the vapor phase in ambient air.	Not available	Not available	Not available
Ethane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Highly volatile from water.	Accumulates very little in the bodies of living organisms.	Leaches through the soil or the sediment at a slow rate.
Nitrogen	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
Carbon Monoxide	Fish toxicity: 75000 ug/L 1 day(s) LC100 (Mortality) Orangespotted sunfish (Lepomis humilis) Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Highly volatile from water.	Not available	Not expected to leach through the soil or the sediment.
Hydrogen	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Not available	Not available	Not available
Hexane	Fish toxicity: 2500 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (Pimephales promelas) Invertebrate toxicity: Not available Algal toxicity: 75 ug/L 28 hour(s) (Population Growth) Green algae (Chlamydomonas sp) Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Highly volatile from water.	Accumulates very little in the bodies of living organisms.	Not expected to leach through the soil or the sediment.
Methane	Fish toxicity: Not available Invertebrate toxicity: Not available Algal toxicity: Not available Phyto toxicity: Not available Other toxicity: Not available	Relatively non-persistent in the environment. Moderately volatile from water.	Accumulates very little in the bodies of living organisms.	Not expected to leach through the soil or the sediment.

Section 13: Disposal Considerations

iso-Pentane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
n-Pentane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Oxygen	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Isobutane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Propane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Carbon Dioxide	Dispose in accordance with all applicable regulations.
Butane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Ethane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Nitrogen	Dispose in accordance with all applicable regulations.
Carbon Monoxide	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Hydrogen	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Hexane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.
Methane	Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

Section 14: Transportation Information

U.S. DOT 49 CFR 172.101

DOT Information For This Mixture

Shipping Name	Compressed gas, flammable, n.o.s. (Methane, Carbon Monoxide)
UN Number	UN1954
Hazard Class	2.1
Hazard information	FLAMMABLE GAS

Individual Component Information

	Proper Shipping Name	ID Number	Hazard Class or Division	Packing Group	Labeling Requirements	Passenger Aircraft or Railcar Quantity Limitations	Cargo Aircraft Only Quantity Limitations	Additional Shipping Description
iso-Pentane	Pentanes (ISOPENTANE)	UN1265	3	I	3	N/A	N/A	N/A
n-Pentane	Pentanes	UN1265	3	II	3	N/A	N/A	N/A
Oxygen	Oxygen, compressed	UN1072	2.2	Not applicable	2.2; 5.1	75 kg or L	150 kg	N/A
Isobutane	ISOBUTANE see also PETROLEUM GASES, LIQUEFIED	UN1969	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Propane	Propane	UN1978	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Carbon Dioxide	Carbon dioxide	UN1013	2.2	Not applicable	2.2	75 kg or L	150kg	None
Butane	Butane	UN1011	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Ethane	Ethane	UN1035	2.1	Not applicable	2.1	Forbidden	150 kg	N/A
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable	2.2	75 kg or L	150 kg	N/A
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3	Not applicable	2.3; 2.1	Forbidden	25 kg	Toxic-Inhalation Hazard Zone D
Hydrogen	Hydrogen, compressed	UN1049	2.1	Not applicable	2.1	Forbidden	150 kg	None
Hexane	Hexanes	UN1208	3	II	3	5 kg or L	N/A	N/A
Methane	Methane, compressed	UN1971	2.1	Not applicable	2.1	Forbidden	150 kg	N/A

Canadian Transportation of Dangerous Goods

	Shipping Name	UN Number	Class	Packing Group / Risk Group
iso-Pentane	Pentanes	UN1265	3	I
n-Pentane	Pentanes	UN1265	3	II
Oxygen	Oxygen, compressed	UN1072	2.2; 5.1	Not applicable
Isobutane	Isobutane	UN1969	2.1	Not applicable
Propane	Propane	UN1978	2.1	Not applicable
Carbon Dioxide	Carbon dioxide	UN1013	2.2	Not applicable
Butane	Butane	UN1011	2.1	Not applicable
Ethane	Ethane	UN1035	2.1	Not applicable
Nitrogen	Nitrogen, compressed	UN1066	2.2	Not applicable
Carbon Monoxide	Carbon monoxide, compressed	UN1016	2.3; 2.1	Not applicable
Hydrogen	Hydrogen, compressed	UN1049	2.1	Not applicable
Hexane	Hexanes	UN1208	3	II
Methane	Methane, compressed	UN1971	2.1	Not applicable

Section 15: Regulatory Information

U.S. Regulations

	CERCLA Sections	SARA 355.30	SARA 355.40
iso-Pentane	Not regulated.	Not regulated.	Not regulated.
n-Pentane	Not regulated.	Not regulated.	Not regulated.
Oxygen	Not regulated.	Not regulated.	Not regulated.
Isobutane	Not regulated.	Not regulated.	Not regulated.
Propane	Not regulated.	Not regulated.	Not regulated.
Carbon Dioxide	Not regulated.	Not regulated.	Not regulated.
Butane	Not regulated.	Not regulated.	Not regulated.
Ethane	Not regulated.	Not regulated.	Not regulated.
Nitrogen	Not regulated.	Not regulated.	Not regulated.
Carbon Monoxide	Not regulated.	Not regulated.	Not regulated.
Hydrogen	Not regulated.	Not regulated.	Not regulated.
Hexane	5000 LBS HQ	Not regulated.	Not regulated.
Methane	Not regulated.	Not regulated.	Not regulated.

SARA 370.21

	Acute	Chronic	Fire	Reactive	Sudden Release
iso-Pentane	Yes	No	Yes	No	No
n-Pentane	Yes	No	Yes	No	No
Oxygen	No	No	Yes	No	Yes
Isobutane	Yes	No	Yes	No	Yes
Propane	Yes	No	Yes	No	Yes
Carbon Dioxide	Yes	No	No	No	Yes
Butane	Yes	No	Yes	No	Yes
Ethane	Yes	No	Yes	No	Yes
Nitrogen	Yes	No	No	No	Yes
Carbon Monoxide	Yes	No	Yes	No	Yes
Hydrogen	Yes	No	Yes	No	Yes
Hexane	Yes	Yes	Yes	No	No
Methane	Yes	No	Yes	No	Yes

SARA 372.65

iso-Pentane	Not regulated.
n-Pentane	Not regulated.
Oxygen	Not regulated.
Isobutane	Not regulated.
Propane	Not regulated.
Carbon Dioxide	Not regulated.
Butane	Not regulated.
Ethane	Not regulated.
Nitrogen	Not regulated.
Carbon Monoxide	Not regulated.
Hydrogen	Not regulated.
Hexane	n-HEXANE
Methane	Not regulated.

OSHA Process Safety

iso-Pentane	Not regulated.
n-Pentane	Not regulated.
Oxygen	Not regulated.
Isobutane	Not regulated.
Propane	Not regulated.
Carbon Dioxide	Not regulated.
Butane	Not regulated.
Ethane	Not regulated.

Nitrogen	Not regulated.
Carbon Monoxide	Not regulated.
Hydrogen	Not regulated.
Hexane	Not regulated.
Methane	Not regulated.

State Regulations

	CA Proposition 65
iso-Pentane	Not regulated.
n-Pentane	Not regulated.
Oxygen	Not regulated.
Isobutane	Not regulated.
Propane	Not regulated.
Carbon Dioxide	Not regulated.
Butane	Not regulated.
Ethane	Not regulated.
Nitrogen	Not regulated.
Carbon Monoxide	WARNING: This product can expose you to chemicals including Carbon Monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov .
Hydrogen	Not regulated.
Hexane	WARNING: This product can expose you to chemicals including Hexane which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov .
Methane	Not regulated.

Canadian Regulations

	WHMIS Classification
iso-Pentane	B2
n-Pentane	B2
Oxygen	A.C
Isobutane	A, B1.
Propane	A, B1.
Carbon Dioxide	A
Butane	A, B1
Ethane	A, B1.
Nitrogen	A
Carbon Monoxide	A, B1, D1A, D2A
Hydrogen	A, B1.
Hexane	B2, D2A, D2B
Methane	A, B1

National Inventory Status

	US Inventory (TSCA)	TSCA 12b Export Notification	Canada Inventory (DSL/NDSL)
iso-Pentane	Listed on inventory.	Not listed.	Listed on inventory.
n-Pentane	Listed on inventory.	PENTANE CAS NUMBER: 109-66-0 SECTION 4	Listed on inventory.
Oxygen	Listed on inventory.	Not listed.	Not determined.
Isobutane	Listed on inventory.	Not listed.	Listed on inventory.
Propane	Listed on inventory.	Not listed.	Listed on inventory.
Carbon Dioxide	Listed on inventory.	Not listed.	Listed on inventory.
Butane	Listed on inventory.	Not listed.	Listed on inventory.
Ethane	Listed on inventory.	Not listed.	Listed on inventory.
Nitrogen	Listed on inventory.	Not listed.	Listed on inventory.
Carbon Monoxide	Listed on inventory.	Not listed.	Listed on inventory.
Hydrogen	Listed on inventory.	Not listed.	Listed on inventory.
Hexane	Listed on inventory.	Not listed.	Listed on DSL.
Methane	Listed on inventory.	Not listed.	Listed on inventory.

Section 16: Other Information

	MFPA Rating
iso-Pentane	HEALTH=2 FIRE=4 REACTIVITY=0
n-Pentane	HEALTH=2 FIRE=4 REACTIVITY=0
Oxygen	HEALTH=0 FIRE=0 REACTIVITY=0
Isobutane	HEALTH=2 FIRE=4 REACTIVITY=0
Propane	HEALTH=1 FIRE=4 REACTIVITY=0
Carbon Dioxide	HEALTH=2 FIRE=0 REACTIVITY=0
Butane	HEALTH=1 FIRE=4 REACTIVITY=0
Ethane	HEALTH=2 FIRE=4 REACTIVITY=0
Nitrogen	HEALTH=1 FIRE=0 REACTIVITY=0
Carbon Monoxide	HEALTH=3 FIRE=4 REACTIVITY=0
Hydrogen	HEALTH=0 FIRE=4 REACTIVITY=0
Hexane	HEALTH=2 FIRE=3 REACTIVITY=0
Methane	HEALTH=1 FIRE=4 REACTIVITY=0

0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard