

oxygen from the breathing atmosphere, particularly in confined spaces. Signs of asphyxiation will be noticed when oxygen is reduced to below 16%, and may occur in several stages. Symptoms may include rapid breathing and pulse rate, headache, dizziness, visual disturbances, mental confusion, incoordination, mood changes, muscular weakness, tremors, cyanosis, narcosis and numbness of the extremities. Unconsciousness leading to central nervous system injury and possibly death will occur when the atmospheric oxygen concentration is reduced to about 6% to 8% or less. The burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

Target Organs

: Eyes, Skin, Central nervous system, Individuals with pre-existing conditions of the heart, lungs, and blood may have increased susceptibility to symptoms of asphyxia.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.	Weight %
Propane	74-98-6	85 - 100%
Propene; Propylene	115-07-1	0 - 10%
Isobutane	75-28-5	5 - 7%
Ethane	74-84-0	5 - 7%
Butane	106-97-8	0 - 5%
Ethanethiol; Ethyl mercaptan	75-08-1	0.1 - 0.2%

SECTION 4. FIRST AID MEASURES

Inhalation : Remove to fresh air. If not breathing, give artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

Skin contact : Take off contaminated clothing and shoes immediately. Wash off immediately with soap and plenty of water. Seek medical advice if symptoms persist or develop.

Eye contact : In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Seek medical attention.

Ingestion : Ingestion is considered unlikely. If accidentally swallowed obtain immediate medical attention.

Notes to physician : Symptoms: Dizziness, Headache, Nausea, Frostbite, Vomiting, Discomfort

SECTION 5. FIRE-FIGHTING MEASURES

Form : Compressed liquefied gas

Flash point	: -104 °C (-155 °F) Method: ASTM D 93
Auto Ignition temperature	: 410 °C (770 °F)
Lower explosive limit	: 2.1 %(V)
Upper explosive limit	: 9.5 % (V)
Suitable extinguishing media	: Water spray, Dry chemical, Foam, Carbon dioxide (CO ₂), Fire should not be extinguished unless flow of gas can be immediately stopped.
Specific hazards during fire fighting	: Liquid releases flammable vapors at well below ambient temperatures and readily forms a flammable mixture with air. Dangerous fire and explosion hazard when exposed to heat, sparks or flame. Vapors are heavier than air and may travel long distances to a point of ignition and flash back. Container may explode in heat or fire. Do not allow liquid runoff to enter sewers or public waters.
Special protective equipment for fire-fighters	: Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.
Further information	: Keep people away from and upwind of spill/leak. Fire should not be extinguished unless flow of gas can be immediately stopped. If spill or leak has not ignited, determine if water spray may assist in dispersing gas or vapor to protect personnel attempting to stop leak. Use water to cool equipment, surfaces and containers exposed to fire and excessive heat. For large fire the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Isolate area, particularly around ends of storage vessels. Withdraw immediately in the event of a rising sound from a venting safety device. Large fires typically require specially trained personnel and equipment to isolate and extinguish the fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions	: Evacuate nonessential personnel and remove or secure all ignition sources. No road flares, smoking or flames in hazard area. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to contain spill areas. Vapor cloud may be white, but color will dissipate as cloud disperses - fire explosion, and toxic hydrogen sulfide gas hazard may be present after visible cloud is dispersed. Ventilate and gas test area before entering. Do not touch spilled liquid (frostbite/freeze burn hazard!).
Environmental precautions	: Carefully contain and stop the source of the spill, if safe to do so. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material.
Methods for cleaning up	: The product evaporates readily. Consider the use of water spray to disperse gas or vapors. Isolate area until gas has dispersed.

SECTION 7. HANDLING AND STORAGE

Handling	: See also applicable OSHA regulations for the handling and storage of this product, including, but not limited to, 29 CFR 1910.110 Storage and Handling of Liquefied Petroleum Gases.
Advice on protection against	: Keep away from open flames, hot surfaces and sources of ignition. Use only in

- fire and explosion** : well-ventilated areas. Store in a well-ventilated area and in accordance with NFPA 58 "Liquefied Petroleum Gas Code".
- Dust explosion class** : Not applicable
- Requirements for storage areas and containers** : Store only in approved containers. Keep away from flame, sparks, excessive temperatures and open flame. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose containers to sources of ignition.
- Advice on common storage** : Keep away from oxidizing agents and strongly acid or alkaline materials. Keep away from food, drink and animal feed.
- Other data** : Keep in a dry place. Keep away from heat. No decomposition if stored and applied as directed.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

List	Components	CAS-No.	Type:	Value
OSHA Z1	Propane	74-98-6	PEL	1,000 ppm 1,800 mg/m3
	Ethaneithiol; Ethyl mercaptan	75-08-1	Ceiling	10 ppm 25 mg/m3
ACGIH	Propane	74-98-6	TWA	1,000 ppm
	Propene; Propylene	115-07-1	TWA	500 ppm
	Isobutane	75-28-5	TWA	1,000 ppm
	Ethane	74-84-0	TWA	1,000 ppm
	Butane	106-97-8	TWA	1,000 ppm
	Ethaneithiol; Ethyl mercaptan	75-08-1	TWA	0.5 ppm

- Engineering measures** : Use adequate ventilation to keep gas and vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Use explosion-proof equipment and lighting in classified/controlled areas.
- Eye protection** : Where there is a possibility of liquid contact, wear splash-proof safety goggles and faceshield. Ensure that eyewash stations and safety showers are close to the workstation location.
- Hand protection** : Where contact with liquid may occur, wear cold-impervious, insulating gloves.
- Skin and body protection** : Where contact with liquid may occur, wear apron and faceshield. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.
- Respiratory protection** : Use a NIOSH/ MSHA-approved positive-pressure supplied-air respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection. Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Compressed liquefied gas

Appearance : Colorless gas. Cold vapor cloud may be white but the lack of visible gas cloud does not indicate absence of gas. A colorless liquid under pressure.

Odor : Odorless when pure, but may have a natural gas type odor when treated with odorizing agent such as ethyl mercaptan.

Flash point : -104 °C (-155 °F)
Method: ASTM D 93

Auto Ignition temperature : 410 °C (770 °F)

Thermal decomposition : Heating may cause a fire or explosion.

Lower explosive limit : 2.1 % (V)

Upper explosive limit : 9.5 % (V)

pH : Not applicable

Freezing point : -187 °C (-305 °F)

Boiling point : -42.22 °C (-44.00 °F)

Vapor Pressure : <208 psig @ 70 °F

Vapor Density : 1.56 @ 32 °F (0 °C) (Air = 1)

Water solubility : Slight

Percent Volatiles : 100 %

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid : Keep away from strong oxidizers. Keep away from heat and sources of ignition.

Materials to avoid : Strong acids. Copper. Incompatible with oxidizing agents. Explosion hazard when exposed to chlorine dioxide. Heating barium peroxide with propane causes violent exothermic reaction. Heated chlorine-propane mixtures are explosive under some conditions.

Hazardous decomposition products : Carbon monoxide, carbon dioxide and noncombusted hydrocarbons (smoke).

Thermal decomposition : Heating may cause a fire or explosion.

Hazardous reactions : Gas may form explosive mixture with air. Note: No decomposition if used as directed.

SECTION 11. TOXICOLOGICAL INFORMATION

Carcinogenicity

- NTP** : No component of this product which is present at levels greater than or equal to 0.1 % is identified as a known or anticipated carcinogen by NTP.
- IARC** : No component of this product which is present at levels greater than or equal to 0.1 % is identified as probable, possible or confirmed human carcinogen by IARC.
- OSHA** : No component of this product which is present at levels greater than or equal to 0.1 % is identified as a carcinogen or potential carcinogen by OSHA.
- CA Prop 65** : This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.
- Skin irritation** : Direct contact to skin or mucous membranes with liquefied product or cold vapor may cause freeze burns and frostbite.
- Eye irritation** : Direct contact to skin or mucous membranes with liquefied product or cold vapor may cause freeze burns and frostbite.
- Further information** : Concentration above the admissible concentration at the workplace may cause dizziness, headache and inebriation.
Propane exhibits some degree of anesthetic action and is mildly irritating to the mucous membranes.
At high concentrations propane acts as a simple asphyxiant without other significant physiological effects.

Component:

Propane	74-98-6	<p><u>Skin irritation:</u> Classification: Irritating to skin. Result: Skin irritation</p> <p><u>Eye irritation:</u> Classification: Irritating to eyes. Result: Mild eye irritation</p>
Propene; Propylene	115-07-1	<p><u>Acute inhalation toxicity:</u> LC50 rat Dose: 658 mg/l Exposure time: 4 h</p> <p><u>Eye irritation:</u> Classification: Irritating to eyes. Result: Mild eye irritation</p>
Ethane	74-84-0	<p><u>Skin irritation:</u> Classification: Irritating to skin. Result: Skin irritation</p> <p><u>Eye irritation:</u> Classification: Irritating to eyes. Result: Eye irritation</p>
Ethanethiol; Ethyl mercaptan	75-08-1	<p><u>Acute oral toxicity:</u> LD50 rat Dose: 682 mg/kg</p> <p><u>Acute inhalation toxicity:</u> LC50 rat Dose: 11.4 mg/l Exposure time: 4 h</p> <p><u>Skin irritation:</u> Classification: Irritating to skin. Result: Mild skin irritation</p> <p><u>Eye irritation:</u> rabbit Classification: Irritating to eyes. Result: Mild eye irritation</p>

SECTION 12. ECOLOGICAL INFORMATION

Additional ecological information : Liquid release is only expected to cause localized, non-persistent environmental damage, such as freezing. Biodegradation of this product may occur in soil and water. Volatilization is expected to be the most important removal process in soil and water. This product is expected to exist entirely in the vapor phase in ambient air.

Component:

Ethanethiol; Ethyl mercaptan 75-08-1 Acute and prolonged toxicity for aquatic invertebrates:
 EC50
 Species: Daphnia magna (Water flea)
 Dose: 0.38 mg/l
 Exposure time: 24 h

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal : Consult federal, state and local waste regulations to determine appropriate waste characterization of material and allowable disposal methods.

SECTION 14. TRANSPORT INFORMATION

CFR

Proper shipping name : PROPANE
 UN-No. : 1978
 Class : 2.1
 Packing group :

TDG

Proper shipping name : PROPANE
 UN-No. : UN1978
 Class : 2.1
 Packing group :

IATA Cargo Transport

UN UN-No. : UN1978
 Description of the goods : PROPANE
 Class : 2.1
 ICAO-Labels : 2.1
 Packing instruction (cargo aircraft) : 200

IATA Passenger Transport

UN-No. : UN1978
 Class : 2.1
 Not permitted for transport

IMDG-Code

UN-No. : UN 1978
 Description of the goods : PROPANE
 Class : 2.1
 IMDG-Labels : 2.1
 EmS Number : F-D S-U
 Marine pollutant : No

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : Flammable liquid
Compressed Gas

TSCA Status : On TSCA Inventory

DSL Status : All components of this product are on the Canadian DSL list.

SARA 311/312 Hazards : Fire Hazard
Sudden Release of Pressure Hazard
Acute Health Hazard

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIROMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil. Fractions of crude oil, and products (both finished and intermediate) from the crude oil refining process and any indigenous components of such from the CERCLA Section 103 reporting requirements. However, other federal reporting requirements, including SARA Section 304, as well as the Clean Water Act may still apply.

SARA III US. EPA Emergency Planning and Community Right-To-Know Act (EPCRA) SARA Title III Section 313 Toxic Chemicals (40 CFR 372.65) - Supplier Notification Required

<u>Components</u>	<u>CAS-No.</u>
Propene; Propylene	115-07-1

PENN RTK US. Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

<u>Components</u>	<u>CAS-No.</u>
Propene; Propylene	115-07-1
Isobutane	75-28-5
Ethane	74-84-0
Butane	106-97-8
Propane	74-98-6

MASS RTK US. Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

<u>Components</u>	<u>CAS-No.</u>
Propane	74-98-6
Butane	106-97-8
Isobutane	75-28-5
Propene; Propylene	115-07-1

NJ RTK US. New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

<u>Components</u>	<u>CAS-No.</u>
Propene; Propylene	115-07-1
Isobutane	75-28-5
Ethane	74-84-0

Butane 106-97-8

Propane 74-98-6

California Prop. 65 : This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16. OTHER INFORMATION

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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