

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Propane (MSDS No. P-4646-F)		Trade Name: Liquefied Petroleum Gas	
Chemical Name: Propane		Synonyms: Dimethylmethane, N-propane, propyl hydride, propylhydride, refrigerant gas R290	
Formula: C ₃ H ₈		Chemical Family: Alkane	
Telephone:	Emergencies: 1-800-645-4633* CHEMTREC: 1-800-424-9300* Routine: 1-800-PRAXAIR	Company Name: Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113	

* 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).

2. Composition/Information on Ingredients

This section covers materials of manufacture only. See sections 3, 8, 10, 11, 15, and 16 for information on by-products generated during use, especially use in welding and cutting. See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Propane	74-98-6	>99%*	1000 ppm	1000 ppm**

* The symbol > means "greater than."

** Aliphatic hydrocarbon gases (ACGIH, 2004)

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Flammable liquid and gas under pressure.

Can form explosive mixtures with air.

May cause frostbite.

May cause dizziness and drowsiness.

Self-contained breathing apparatus may be required by rescue workers.

Odor: Faintly disagreeable

THRESHOLD LIMIT VALUE: TLV-TWA, 1000 ppm, aliphatic hydrocarbon gases (ACGIH, 2004). Hazardous fumes may be generated during welding with this product. See section 16 for more information on welding hazards. TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

SKIN CONTACT—No harm expected from vapor. Liquid may cause frostbite.

SWALLOWING—An unlikely route of exposure. This product is a gas at normal temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid.

EYE CONTACT—No harm expected from vapor. Liquid may cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No harm expected.

OTHER EFFECTS OF OVEREXPOSURE: At very high concentrations, propane may produce cardiac arrhythmias or arrest due to sensitization of the heart to adrenaline and noradrenalin.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The toxicology and the physical and chemical properties of propane suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH

HAZARD EVALUATION: In a study conducted in 1948, dogs breathed varying mixtures of hydrocarbons and oxygen for 10 minutes. Of a group of dogs exposed to propane, all (3 of 3) showed myocardial sensitivity to injected epinephrine hydrochloride as determined by electrocardiogram (EKG) readings. No direct evidence is known of propane-induced cardiac sensitization in humans.

CARCINOGENICITY: Propane is not listed by NTP, OSHA, or IARC.

4. First Aid Measures

INHALATION: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

SWALLOWING: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

EYE CONTACT: For contact with the liquid, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

NOTES TO PHYSICIAN: *This material may be a cardiac sensitizer; avoid the use of epinephrine. There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

5. Fire Fighting Measures

FLASH POINT (test method):	-156°F (-104°C) TCC	
AUTOIGNITION TEMPERATURE:	842°F (450°C)	
FLAMMABLE LIMITS IN AIR, % by volume:	LOWER: 2.1%	UPPER: 9.5%

EXTINGUISHING MEDIA: CO₂, dry chemicals, water spray, or fog.

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Flammable liquid and gas under pressure. Evacuate all personnel from danger area. Immediately cool cylinders with water spray from maximum distance, taking care not to extinguish flames. Remove ignition sources if without risk. Remove all cylinders from area of fire if without risk, while continuing cooling water spray. Do not extinguish any flames emitted from cylinders. Stop flow of gas if without risk, or allow flames to burn out. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable gas. Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). Propane cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.) If venting or leaking propane catches fire, do not extinguish flames. Flammable gas may spread from leak, creating an explosive re-ignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

HAZARDOUS COMBUSTION PRODUCTS: Carbon monoxide, carbon dioxide

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Flammable liquid and gas under pressure. Forms explosive mixtures with air. (See section 5.) Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable vapors may spread from leak. Before entering area, especially confined areas, check atmosphere with an approved device.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Separate propane cylinders from oxygen, chlorine, and other oxidizers by at least 20 ft (6.1 m) or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) 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" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas 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.

PRECAUTIONS TO BE TAKEN IN HANDLING: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped propane systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Leak check system with soapy water; never use a flame. 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. For other precautions in using propane, see section 16.

For further information on storage, handling, and use of this product, see NFPA 55, *Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*, published by the National Fire Protection Association.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—An explosion-proof local exhaust system is acceptable. See SPECIAL.

MECHANICAL (general)—Inadequate; see SPECIAL.

SPECIAL—Use only in a closed system.

OTHER—None

RESPIRATORY PROTECTION: Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

SKIN PROTECTION: Wear work gloves for cylinder handling and to prevent exposure to liquid. Wear welding gloves for welding.

EYE PROTECTION: Wear safety glasses when handling cylinders; for welding, see section 16. Select eye protection in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. For welding, see section 16. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	44.096
SPECIFIC GRAVITY (H ₂ O = 1) at 77°F (25°C) and 1 atm:	0.5077
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm:	1.523
VAPOR PRESSURE at 70°F (21.1°C):	109.73 psig (756.56 kPa)
SOLUBILITY IN WATER , vol/vol at 100°F (37.8°C) and 1 atm:	0.065
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	High
BOILING POINT at 1 atm:	-43.67°F (-42.04°C)
FREEZING POINT at 1 atm:	-305.84°F (-187.69°C)

APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure, faintly disagreeable odor.

10. Stability and Reactivity

STABILITY: Unstable Stable
INCOMPATIBILITY (materials to avoid): Oxidizing agents, chlorine dioxide
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition and burning may produce CO/CO₂.
HAZARDOUS POLYMERIZATION: May Occur Will Not Occur
CONDITIONS TO AVOID: None known.

11. Toxicological Information

Possible cardiac sensitization to epinephrine; see section 3. The welding process may generate hazardous fumes and gases. (See sections 3, 10, 15, and 16.)

12. Ecological Information

No adverse ecological effects expected. Propane does not contain any Class I or Class II ozone-depleting chemicals. Propane is not listed as a marine pollutant by DOT.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME: Propane
HAZARD CLASS: 2.1 **IDENTIFICATION NUMBER:** UN 1978 **PRODUCT RQ:** None
SHIPPING LABEL(s): FLAMMABLE GAS
PLACARD (when required): FLAMMABLE GAS
SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.
Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:

SECTIONS 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

Threshold Planning Quantity (TPQ): None

EHS RQ: None

SECTIONS 311/312: Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

IMMEDIATE: Yes

PRESSURE: Yes

DELAYED: No

REACTIVITY: No

FIRE: Yes

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Propane does not require reporting under Section 313.

40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Propane is listed as a regulated substance in quantities of 10,000 lb (4536 kg) or greater.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Propane is listed on the TSCA inventory.

OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Propane is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location in quantities of 10,000 lb (4536 kg) or greater is covered under this regulation unless the gas is used as a fuel.

STATE REGULATIONS:

CALIFORNIA: Propane is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

WARNING: The combustion of propane produces carbon monoxide—a chemical known to the State of California to cause birth defects or other reproductive harm.

(California Health and Safety Code §25249.5 et seq.)

PENNSYLVANIA: Propane is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

16. Other Information

Be sure to read and understand all labels and instructions supplied with all containers of propane.

SPECIAL PRECAUTIONS: *Use in welding and cutting.* Using propane in welding and cutting may create special hazards, including those from fumes, gases, and other by-products of the welding process. Be sure to read and understand the manufacturer's instructions and the precautionary labels on all products. For more information, ask your welding products supplier for a copy of Praxair's free safety booklet, P-2035, *Precautions and Safe Practices for Gas Welding, Cutting, and Heating*. For a detailed treatment, get ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society (AWS), PO Box 351040, Miami, FL 33135, or see OSHA's Web site at <http://www.osha-slc.gov/SLTC/weldingcuttingbrazing/>. Order AWS documents from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5710, <http://global.ihc.com/>.

Arcs and sparks can ignite combustible materials. Prevent fires. **Do not strike an arc on the cylinder.** The defect caused by an arc burn could lead to cylinder rupture. For more information on fire prevention in welding and cutting, see NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hotwork*, published by the National Fire Protection Association.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Flammable liquid and gas under pressure.* May form explosive mixtures with air. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only in a closed system. Use only spark-proof tools and explosion-proof equipment. Ground all equipment. Keep away from heat, sparks, and open flame. *Gas can cause rapid suffocation due to oxygen deficiency.* Store and use with adequate ventilation. Close cylinder valve after each use; keep closed even when empty. **Never work on a pressurized system.** If there is a leak, blow the system down in an environmentally safe manner in compliance with all federal, state, and local laws, then repair the leak. **Never allow a compressed gas cylinder to become part of an electrical circuit.**

NOTE: *Prior to using any plastics, confirm their compatibility with propane.*

MIXTURES: When you mix two or more gases or liquefied gases, you can 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 evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:

NFPA RATINGS:

HEALTH	= 2
FLAMMABILITY	= 4
INSTABILITY	= 0
SPECIAL	= None

HMIS RATINGS:

HEALTH	= 1
FLAMMABILITY	= 4
PHYSICAL HAZARD	= 2

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-510 (gas withdrawal) CGA-555 (liquid withdrawal)
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 pamphlet V-1 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, <http://www.cganet.com/Publication.asp>.

- AV-1 *Safe Handling and Storage of Compressed Gases*
- P-1 *Safe Handling of Compressed Gases in Containers*
- SB-2 *Oxygen-Deficient Atmospheres*
- SB-8 *Use of Oxy-Fuel Gas Welding and Cutting Apparatus*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
- *Handbook of Compressed Gases, Fourth Edition*

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.

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.

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Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113