

## Praxair Material Safety Data Sheet

### 1. Chemical Product and Company Identification

<b>Product Name:</b> Butane (MSDS No. P-4572-G)	<b>Trade Names:</b> Butane
<b>Chemical Name:</b> n-Butane	<b>Synonyms:</b> Methylethylmethane, diethyl, n-butane, butyl hydride
<b>Chemical Family:</b> Alkane	<b>Product Grades:</b> 2.0, 2.5-Instrument, 3.5 Research
<b>Telephone:</b>	<b>Company Name:</b> Praxair, Inc.
<b>Emergencies:</b> 1-800-645-4633*	39 Old Ridgebury Road
<b>CHEMTREC:</b> 1-800-424-9300*	Danbury, CT 06810-5113
<b>Routine:</b> 1-800-PRAXAIR	

\*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).

### 2. Hazards Identification

#### EMERGENCY OVERVIEW

**DANGER! Flammable liquid and gas under pressure.**  
**Can form explosive mixtures with air.**  
**May cause frostbite.**  
**Can cause rapid suffocation.**  
**May cause dizziness and drowsiness.**  
**Self-contained breathing apparatus may be required by rescue workers.**  
**Under ambient conditions, this is a colorless gas with a faintly disagreeable odor.**

**OSHA REGULATORY STATUS:** This material is considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

#### POTENTIAL HEALTH EFFECTS:

##### Effects of a Single (Acute) Overexposure

**Inhalation.** May be mildly irritating to mucous membranes. At high concentrations, may cause drowsiness. At very high concentrations, may act as an asphyxiant and cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

**Skin Contact.** No harm expected from gas. 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.** Butane is relatively nonirritating to the eyes, but liquid may cause frostbite.

**Effects of Repeated (Chronic) Overexposure.** Repeated or prolonged exposure of the skin may cause cracking and drying.

**Other Effects of Overexposure.** None known.

**Medical Conditions Aggravated by Overexposure.** The skin irritating properties of butane may aggravate an existing dermatitis.

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

**POTENTIAL ENVIRONMENTAL EFFECTS:** None known. For further information, see section 12, Ecological Information.

### 3. Composition/Information on Ingredients

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

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
n-Butane	106-97-8	>99%*

\*The symbol > means "greater than."

### 4. First Aid Measures

**INHALATION:** 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:** 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. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

### 5. Fire Fighting Measures

**FLAMMABLE PROPERTIES:** Flammable gas.

**SUITABLE EXTINGUISHING MEDIA:** CO<sub>2</sub>, dry chemical, water spray, or fog.

**PRODUCTS OF COMBUSTION:** Carbon monoxide, carbon dioxide

**PROTECTION OF FIREFIGHTERS: DANGER! Flammable liquid and gas under pressure.** Evacuate all personnel from danger area. Immediately spray cylinders with water from maximum distance until cool, taking care not to extinguish flames. Remove sources of ignition if without risk. Remove all cylinders from fire area if without risk; continue cooling water spray while moving cylinders. 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.

**Specific Physical and Chemical Hazards.** Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). Butane cylinders are equipped with a pressure-relief device. (Exceptions may exist where authorized by DOT.) If venting or leaking butane 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.

**Protective Equipment and Precautions for Firefighters.** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**DANGER! Flammable liquid and gas under pressure.**

**Personal Precautions.** 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 appropriate device.

**Environmental Precautions.** 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 HANDLING:** Keep away from heat, sparks, and open flame. ***Gas can cause rapid suffocation due to oxygen deficiency.*** Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped butane systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Leak check 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 butane, see section 16.

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Separate butane cylinders from oxygen 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. Butane cylinders designed to accept a valve protection cap must be provided with a cap. Screw 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.

**RECOMMENDED PUBLICATIONS:** For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

## 8. Exposure Controls/Personal Protection

**See section 16 for important information on by-products generated during use in welding and cutting.**

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2008)
n-Butane	Not Established.	1000 ppm

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = Not available.

### ENGINEERING CONTROLS:

**Local Exhaust.** Use an explosion-proof local exhaust system with sufficient air flow velocity to maintain the butane concentration below applicable exposure limits in the worker's breathing zone.

**Mechanical (General).** Under certain conditions, general exhaust ventilation may be acceptable to keep butane below TLV levels in the worker's breathing zone.

**Special.** Use only in a closed system.

**Other.** None

### PERSONAL PROTECTIVE EQUIPMENT:

**Skin Protection.** Wear work gloves for cylinder handling; welding gloves for welding. Metatarsal shoes for cylinder handling. For welding, see section 16. Select equipment in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

**Eye/Face Protection.** Wear safety glasses when handling cylinders; for welding, see section 16. Select eye protection in accordance with OSHA 29 CFR 1910.133.

**Respiratory Protection.** A respiratory protection program that meet OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus.

### 9. Physical and Chemical Properties

<b>APPEARANCE:</b>	Colorless gas	
<b>ODOR:</b>	Faintly disagreeable	
<b>ODOR THRESHOLD:</b>	Above 5000 ppm	
<b>PHYSICAL STATE:</b>	Gas at normal temperature and pressure	
<b>pH:</b>	Not applicable.	
<b>MELTING POINT</b> at 1 atm:	-216.92°F (-138.29°C)	
<b>BOILING POINT</b> at 1 atm:	31.10°F (-0.50°C)	
<b>FLASH POINT</b> (test method):	-76°F (-60°C) TCC	
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	High	
<b>FLAMMABILITY:</b>	Flammable	
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> 1.8%	<b>UPPER:</b> 8.5%
<b>VAPOR PRESSURE</b> at 68°F (20°C):	31 psia (214 kPa abs)	
<b>LIQUID DENSITY</b> at 77°F (25°C)	35.8 lb/ft <sup>3</sup> (573 kg/m <sup>3</sup> )	
<b>VAPOR DENSITY</b> at 70°F (21.1°C) and 1 atm:	0.1503 lb/ft <sup>3</sup> (2.407 kg/m <sup>3</sup> )	
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1) at 19.4°F (-7°C):	1.22	
<b>SPECIFIC GRAVITY</b> (Air = 1) at 70°F (21.1°C) and 1 atm:	2.007	
<b>SOLUBILITY IN WATER</b> , vol/vol at 100°F (37.8°C) and 1 atm:	0.000061	
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.	
<b>AUTOIGNITION TEMPERATURE:</b>	761°F (405°C)	
<b>DECOMPOSITION TEMPERATURE:</b>	Not available.	
<b>PERCENT VOLATILES BY VOLUME:</b>	100	
<b>MOLECULAR WEIGHT:</b>	58.12	
<b>MOLECULAR FORMULA:</b>	C <sub>4</sub> H <sub>10</sub>	

### 10. Stability and Reactivity

**CHEMICAL STABILITY:**  Unstable  Stable

**CONDITIONS TO AVOID:** None known.

**INCOMPATIBLE MATERIALS:** Oxidizing agents, nickel carbonyl and oxygen mixtures

**HAZARDOUS DECOMPOSITION PRODUCTS:** Thermal decomposition and burning may produce CO/CO<sub>2</sub>.

**POSSIBILITY OF HAZARDOUS REACTIONS:**  May Occur  Will Not Occur

Thermal decomposition and burning may produce CO/CO<sub>2</sub>.

### 11. Toxicological Information

**ACUTE DOSE EFFECTS:** LC<sub>50</sub> = 5,555 ppmv. The welding process may generate hazardous fumes and gases. (See sections 3, 10, 15, and 16.)

**STUDY RESULTS:** In a study conducted in 1948, dogs breathed varying mixtures of hydrocarbons and oxygen for 10 minutes. Of a group of dogs exposed to butane, all (2/2) showed myocardial sensitivity to injected epinephrine hydrochloride as determined by electrocardiogram (EKG) readings. No direct evidence is known of butane-induced cardiac sensitization in humans.

### 12. Ecological Information

**ECOTOXICITY:** No known effects.

**OTHER ADVERSE EFFECTS:** Butane does not contain any Class I or Class II ozone-depleting chemicals.

### 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:** Butane

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.1	NA/NA*	UN1011	None
<b>SHIPPING LABEL(s):</b> FLAMMABLE GAS			
<b>PLACARD (when required):</b> FLAMMABLE GAS			

\*NA=Not applicable.

**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)].

**MARINE POLLUTANTS:** Butane is not listed as a marine pollutant by DOT.

### 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):

**TPQ:** None

**EHS RQ (40 CFR 355):** 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

**DELAYED:** No

**PRESSURE:** Yes

**REACTIVITY:** No

**FIRE:** Yes

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

Butane is not subject to 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.

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

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** Butane 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.

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

**WARNING:** Combustion of this gas 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:** Butane 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 this product.

**SPECIAL PRECAUTIONS: Use in welding and cutting.** Using butane 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.ihs.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.** Use piping and equipment adequately designed to withstand pressures to be encountered. Use a backflow prevention device in any piping. For more information, see NFPA 51: *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, published by the National Fire Prevention Association. Use only in a closed system. Use only spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation. Close cylinder valve when not in use; keep closed even when empty. Close 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 place a compressed gas cylinder where it may become part of an electrical circuit.** *When using compressed gases in and around electric welding applications, never ground the cylinders. Grounding exposes the cylinders to damage by the electric welding arc.*

**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	= 1
FLAMMABILITY	= 4
INSTABILITY	= 0
SPECIAL	= None

##### HMIS RATINGS:

HEALTH	= 0
FLAMMABILITY	= 4
PHYSICAL HAZARD	= 1

#### STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-510
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 can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5<sup>th</sup> 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.

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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