SAFETY DATA SHEET

1. Identification
Product identifier Butane
Other means of identification
SDS number 303 - GHS
Synonyms Butane, Normal Butane, n-Butane, Commercial Butane, Mixed Butane, Natural Butane.
Recommended use This product is intended for use as a refinery feedstock, fuel or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.
Recommended restrictions None known.
Manufacturer/Importer/Supplier/Distributor information
Manufacturer/Supplier Valero Marketing & Supply Company and Affiliates
One Valero Way
San Antonio, TX 78269-6000
General Assistance 210-345-4593
E-Mail CorpHSE@valero.com
Contact Person Industrial Hygienist
Emergency Telephone 24 Hour Emergency 866-565-5220
1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification
Physical hazards Flammable gases Category 1
Gases under pressure Liquefied gas
Health hazards Germ cell mutagenicity Category 1B
Carcinogenicity Category 1A
OSHA defined hazards Simple asphyxiant
Label elements

Signal word Danger
Hazard statement Contains gas under pressure; may explode if heated.
Precautionary statement
Prevention Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
Response If exposed or concerned: Get medical advice/attention. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Storage Store locked up. Protect from sunlight. Store in a well-ventilated place.
Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients
Mixtures
<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butane</td>
<td>106-97-8</td>
<td>94 - 100</td>
</tr>
<tr>
<td>Isobutane</td>
<td>75-28-5</td>
<td>0 - 6</td>
</tr>
</tbody>
</table>

Prepared by 3E Company
4. First-aid measures

**Inhalation**
Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a physician or poison control center immediately.

**Skin contact**
When high-pressure isobutane liquid is placed under reduced lower pressure, isobutane vaporizes to be cooled. Thus, skin contact with isobutane may cause frostbite. Wash frost-bitten areas with plenty of water. Do not remove clothing. Get medical attention immediately.

**Eye contact**
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

**Ingestion**
Ingestion is not a typical route of exposure for gases or liquefied gases.

**Most important symptoms/effects, acute and delayed**
Narcosis. Decrease in motor functions. Behavioral changes. Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

**Indication of immediate medical attention and special treatment needed**
Treat symptomatically.

5. Fire-fighting measures

**Suitable extinguishing media**
Dry chemical, CO2, water spray, fog, or foam.

**Unsuitable extinguishing media**
None known.

**Specific hazards arising from the chemical**
Extremely flammable gas. Gases may form explosive mixtures with air. Vapors are heavier than air and may travel along the ground to some distant source of ignition and flash back.

**Special protective equipment and precautions for firefighters**
None known.

**Fire-fighting equipment/instructions**
Self-contained breathing apparatus, operated in positive pressure mode and full protective clothing must be worn in case of fire.

Move container from fire area if it can be done without risk.

Do not extinguish fires unless gas flow can be stopped safely; explosive re-ignition may occur. Promptly isolate the scene by removing all persons from the vicinity of the incident. No action shall be taken involving any personal risk or without suitable training. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus. Stop flow of material. Use water to keep fire exposed containers cool and to protect personnel effecting shutoff. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop leak. Prevent runoff from fire control or dilution from entering streams, sewers or drinking water supply.

6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Evacuate the area promptly. No action shall be taken involving any personal risk or without suitable training. Keep unnecessary personnel away.

Ensure adequate ventilation. In case of inadequate ventilation, use respiratory protection. Wear appropriate personal protective equipment (See Section 8).

Ventilate well, stop flow of gas or liquid if possible. Immediately contact emergency personnel.

**Methods and materials for containment and cleaning up**
Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent from entering into soil, ditches, sanitary sewers, waterways and/or groundwater.

**Environmental precautions**

7. Handling and storage

**Precautions for safe handling**
Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity.

Wear appropriate personal protective equipment (See Section 8). Eating, drinking, and smoking should be prohibited in areas where this material is handled, stored, and processed. Do not breathe gas. Do not get in eyes, on skin, on clothing. Use only with adequate ventilation.

**Conditions for safe storage, including any incompatibilities**
Store in accordance with local, regional, national, and international regulations. Secure cylinders in an upright position at all times, close all valves when not in use. Store in a cool, dry, well-ventilated place. Keep container tightly closed and sealed until ready for use. Protect cylinders from damage.
8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-butadiene (CAS 106-99-0)</td>
<td>STEL</td>
<td>5 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

US. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butane (CAS Mixture)</td>
<td>TWA</td>
<td>1000 ppm</td>
</tr>
<tr>
<td><strong>Components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,3-butadiene (CAS 106-99-0)</td>
<td>TWA</td>
<td>2 ppm</td>
</tr>
<tr>
<td>Butane (CAS 106-97-8)</td>
<td>STEL</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Butylene (CAS 25167-67-3)</td>
<td>TWA</td>
<td>250 ppm</td>
</tr>
<tr>
<td>Isobutane (CAS 75-28-5)</td>
<td>STEL</td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butane (CAS Mixture)</td>
<td>REL</td>
<td>1900 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 ppm</td>
</tr>
<tr>
<td><strong>Components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butane (CAS 106-97-8)</td>
<td>TWA</td>
<td>1900 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 ppm</td>
</tr>
<tr>
<td>Isobutane (CAS 75-28-5)</td>
<td>TWA</td>
<td>1900 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>800 ppm</td>
</tr>
</tbody>
</table>

Biological limit values

ACGIH Biological Exposure Indices

<table>
<thead>
<tr>
<th>Components</th>
<th>Value</th>
<th>Determinant</th>
<th>Specimen</th>
<th>Sampling Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-butadiene (CAS 106-99-0)</td>
<td>2.5 mg/l</td>
<td>1,2-Dihydroxy-4-(N-acetylcyst</td>
<td>Urine</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>einyl)-butane</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.5 pmol/g</td>
<td>Mixture of N-1- and N-2-(hydroxybutenyl)valine (Hb) adducts</td>
<td>Hemoglobin in blood</td>
<td>*</td>
</tr>
</tbody>
</table>

* - For sampling details, please see the source document.

Appropriate engineering controls

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. The engineering controls also need to keep gas, vapor, or dust concentrations below any lower explosive limits.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear approved safety glasses or goggles.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves.

Other

Wear protective clothing appropriate for the risk of exposure.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.

Thermal hazards

Contact with liquefied gas might cause frostbites, in some cases with tissue damage. Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Do not eat, drink or smoke when using the product. Wash thoroughly after handling. Provide eyewash station and safety shower. Handle in accordance with good industrial hygiene and safety practices.
9. Physical and chemical properties

Appearance
Gas. Compressed liquefied gas.

Physical state
Gas.

Form
Not available.

Color
Colorless

Odor
Gasoline-like.

Odor threshold
Not available.

pH
Not available.

Melting point/freezing point
-266.35 °F (-165.75 °C) Weighted average

Initial boiling point and boiling range
Not available.

Flash point
-76.0 °F (-60.0 °C) Closed Cup (Butane)

Evaporation rate
Not available.

Flammability (solid, gas)
Not available.

Upper/lower flammability or explosive limits

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability limit - lower (%)</td>
<td>1.9 % (Butane)</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>8.5 % (Butane)</td>
</tr>
<tr>
<td>Explosive limit - lower (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Explosive limit - upper (%)</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

Vapor pressure
Not available.

Vapor density
2 Air = 1

Relative density
0.57 (water=1) Weighted average

Solubility (water)
Insoluble in the cold water.

Partition coefficient
(n-octanol/water)
Not available.

Auto-ignition temperature
Not available.

Decomposition temperature
Not available.

Viscosity
Not available.

Other information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular formula</td>
<td>Mixture, not applicable</td>
</tr>
<tr>
<td>Percent volatile</td>
<td>Essentially 100%</td>
</tr>
<tr>
<td>VOC (Weight %)</td>
<td>100 %</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactivity
Not available.

Chemical stability
Stable under normal temperature conditions and recommended use.

Possibility of hazardous reactions
Polymerization will not occur.

Conditions to avoid
In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Incompatible materials

Hazardous decomposition products
No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

<table>
<thead>
<tr>
<th>Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingestion</td>
<td>Not likely, due to the form of the product.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Breathing of high concentrations may cause dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness. Suffocation (asphyxiating) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.</td>
</tr>
</tbody>
</table>
Skin contact
Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Eye contact
Contact with liquefied gas may cause frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

Information on toxicological effects

Acute toxicity
Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-butadiene (CAS 106-99-0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td>Rat</td>
<td>285 mg/l, 4 Hours</td>
</tr>
<tr>
<td>Oral</td>
<td>Rat</td>
<td>5.48 g/kg</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation
Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

Serious eye damage/eye irritation
Direct contact with liquefied gas may cause eye damage from frostbite.

Respiratory or skin sensitization

Respiratory sensitization
Based on available data, the classification criteria are not met.

Skin sensitization
Not a skin sensitizer.

Germ cell mutagenicity
May cause genetic defects.

Carcinogenicity
May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity
1,3-butadiene (CAS 106-99-0) 1 Carcinogenic to humans.

NTP Report on Carcinogens
1,3-butadiene (CAS 106-99-0) Known To Be Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
1,3-butadiene (CAS 106-99-0) Cancer

Reproductive toxicity
Based on available data, the classification criteria are not met.

Specific target organ toxicity - single exposure
Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure
Based on available data, the classification criteria are not met.

Aspiration hazard
Based on available data, the classification criteria are not met.

Chronic effects
May cause central nervous system effects. 1,3-Butadiene: Human Epidemiology studies suggest an association between exposure to 1,3-butadiene and development of cancer in humans. Several studies have indicated conflicting results regarding adverse reproductive and developmental effects in laboratory animals. While the overall evidence does not support a causal relationship for adverse reproductive effects in humans, these studies indicate that minimizing exposure to 1,3-butadiene would be an appropriate precaution.

Further information
BUTANES: Studies in laboratory animals indicate exposure to extremely high levels of butanes (1-10 or higher vol-% in air) may cause cardiac arrhythmias (irregular heartbeats), which can be serious or fatal.

12. Ecological information

Ecotoxicity
Not expected to be harmful to aquatic organisms.

Persistence and degradability
Not available.

Bioaccumulative potential
Not available.

Partition coefficient n-octanol / water (log Kow)
<table>
<thead>
<tr>
<th>Compounds</th>
<th>Log Kow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3-butadiene (CAS 106-99-0)</td>
<td>1.99</td>
</tr>
<tr>
<td>Butane (CAS 106-97-8)</td>
<td>2.89</td>
</tr>
<tr>
<td>Isobutane (CAS 75-28-5)</td>
<td>2.76</td>
</tr>
</tbody>
</table>

Mobility in soil
Not available.
Other adverse effects

Not available.

13. Disposal considerations

Disposal instructions
Dispose in accordance with all applicable regulations. Empty containers may contain product residues. Do not puncture or incinerate even when empty. This material and/or its container must be disposed of as hazardous waste. Return the empty cylinder to the supplier.

Hazardous waste code
D001: Waste Flammable material with a flash point <140 °F

Waste from residues / unused products
Dispose of in accordance with local regulations.

Contaminated packaging
Offer rinsed packaging material to local recycling facilities.

14. Transport information

DOT

UN number
UN1011

UN proper shipping name
Butane

Transport hazard class(es)

Class
2.1

Subsidiary risk
-

Packing group
Not applicable.

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

Special provisions
19, T50

Packaging exceptions
306

Packaging non bulk
304

Packaging bulk
314, 315

IATA

UN number
UN1011

UN proper shipping name
Butane

Transport hazard class(es)

Class
2.1

Subsidiary risk
-

Label(s)
2.1

Packing group
Not applicable.

Environmental hazards
No.

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number
UN1011

UN proper shipping name
Butane

Transport hazard class(es)

Class
2.1

Subsidiary risk
-

Label(s)
2.1

Packing group
Not applicable.

Environmental hazards
No.

EmS
Not available.

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable. This product is a compressed or liquefied gas and when transported in bulk is covered under IGC code.

15. Regulatory information

US federal regulations
This product is hazardous according to OSHA 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

1,3-butadiene (CAS 106-99-0)
Cancer
Eye irritation
Respiratory tract irritation
Central nervous system
Flammability
CERCLA Hazardous Substance List (40 CFR 302.4)

- 1,3-butadiene (CAS 106-99-0) LISTED
- Butane (CAS 106-97-8) LISTED
- Isobutane (CAS 75-28-5) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

**Hazard categories**
- Immediate Hazard - Yes
- Delayed Hazard - Yes
- Fire Hazard - Yes
- Pressure Hazard - Yes
- Reactivity Hazard - No

**SARA 302 Extremely hazardous substance**
Not listed.

**SARA 311/312 Hazardous chemical**
Yes

**SARA 313 (TRI reporting)**
Not regulated.

Other federal regulations

- **Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List**
  - 1,3-butadiene (CAS 106-99-0)

- **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
  - 1,3-butadiene (CAS 106-99-0)
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)

- **Safe Drinking Water Act (SDWA)**
  Not regulated.

US state regulations

- **WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

- **US. Massachusetts RTK - Substance List**
  - 1,3-butadiene (CAS 106-99-0)
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)

- **US. New Jersey Worker and Community Right-to-Know Act**
  - 1,3-butadiene (CAS 106-99-0)
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)

- **US. Pennsylvania Worker and Community Right-to-Know Law**
  - 1,3-butadiene (CAS 106-99-0)
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)

- **US. Rhode Island RTK**
  - 1,3-butadiene (CAS 106-99-0)
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)

US. California Proposition 65

- US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
  - 1,3-butadiene (CAS 106-99-0)

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Country(s) or region</td>
<td>Inventory name</td>
<td>On inventory (yes/no)*</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A “Yes” indicates this product complies with the inventory requirements administered by the governing country(s). A “No” indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

**Issue date** 13-August-2013  
**Revision date** 23-May-2014  
**Version #** 02  
**Further information**  
HMIS® is a registered trade and service mark of the NPCA.

**NFPA Ratings**

![NFPA Ratings Diagram](image)

References

- EPA: AQUIRE database  
- US. IARC Monographs on Occupational Exposures to Chemical Agents  
- HSDB® - Hazardous Substances Data Bank  
- National Toxicology Program (NTP) Report on Carcinogens  
- ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.