SAFETY DATA SHEET

1. Identification

Product identifier: Isobutane
Other means of identification:
SDS number: 305-GHS
Synonyms: i-Butane, iso-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
Precautionary statement: Prevention
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. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
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>Isobutane</td>
<td>75-28-5</td>
<td>90 - 100</td>
</tr>
<tr>
<td>Butane</td>
<td>106-97-8</td>
<td>0 - 10</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**
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**
Contact with liquefied gas may cause frostbite.

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

5. Fire-fighting measures

**Suitable extinguishing media**

**Unsuitable extinguishing media**
Do not use a solid water stream as it may scatter and spread fire.

**Specific hazards arising from the chemical**
Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

**Special protective equipment and precautions for firefighters**
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask.

**Fire-fighting equipment/instructions**
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if you can do it without risk. In the event of fire, cool tanks with water spray. Cool containers exposed to flames with water until well after the fire is out. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Vapors may form explosive air mixtures even at room temperature. Prevent buildup of vapors or gases to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage.

**Specific methods**
Use water spray to cool unopened containers.

**General fire hazards**
Extremely flammable gas. Containers may explode when heated.

6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Keep unnecessary personnel away. Local authorities should be advised if significant spillages cannot be contained. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. See Section 8 of the SDS for Personal Protective Equipment.

**Methods and materials for containment and cleaning up**
Ventilate well, stop flow of gas or liquid if possible. Immediately contact emergency personnel.

**Environmental precautions**
Should not be released into the environment. Prevent further leakage or spillage if safe to do so. Prevent material from entering drains, sewers or low lying areas. See section 13 for waste disposal information.

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. ACGIH Threshold Limit Values

<table>
<thead>
<tr>
<th>Material</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobutane (CAS Mixture)</td>
<td>TWA</td>
<td>1000 ppm</td>
</tr>
<tr>
<td>Butane (CAS 106-97-8)</td>
<td>STEL</td>
<td>1000 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>Isobutane (CAS Mixture)</td>
<td>REL</td>
<td>1900 mg/m3</td>
</tr>
<tr>
<td>Butane (CAS 106-97-8)</td>
<td>TWA</td>
<td>1900 mg/m3</td>
</tr>
<tr>
<td>Isobutane (CAS 75-28-5)</td>
<td>TWA</td>
<td>1900 mg/m3</td>
</tr>
</tbody>
</table>

Biological limit values

No biological exposure limits noted for the ingredient(s).

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.

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

Colorless liquefied gas.

Physical state

Gas.

Form

Not available.

Color

Colorless

Odor

Gasoline-like.

Odor threshold

Not available.

pH

Not available.

Melting point/freezing point

-256 °F (-160 °C)

Initial boiling point and boiling range

10.94 °F (-11.7 °C)

Flash point

-117.7 °F (-83.2 °C) Closed Cup

Evaporation rate

Not available.

Flammability (solid, gas)

Not available.

Upper/lower flammability or explosive limits

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability limit - lower (%)</td>
<td>1.8 %</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>8.4 %</td>
</tr>
</tbody>
</table>
### Explosive limit

- **Explosive limit - lower (%)**: Not available.
- **Explosive limit - upper (%)**: Not available.

### Vapor properties

- **Vapor pressure**: Not available.
- **Vapor density**: 2 (Air = 1)
  
### Physicochemical properties

- **Relative density**: 0.557
- **Solubility (water)**: Insoluble in the cold water.
- **Partition coefficient (n-octanol/water)**: Not available.
- **Auto-ignition temperature**: 888.53 °F (475.85 °C)
- **Decomposition temperature**: Not available.
- **Viscosity**: Not available.

### Other information

- **Molecular formula**: Mixture, not applicable
- **Percent volatile**: Essentially 100%
- **VOC (Weight %)**: 100%

### 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
Oxidizing agents. Acids.

#### Hazardous decomposition products
No hazardous decomposition products are known.

### Toxicological information

#### Information on likely routes of exposure

- **Ingestion**: Not likely, due to the form of the product.

- **Inhalation**: Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.

- **Skin contact**: Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

- **Eye contact**: Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

#### Symptoms related to the physical, chemical and toxicological characteristics
Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

#### 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").

#### Components

<table>
<thead>
<tr>
<th>Test Results</th>
<th>Species</th>
<th>Components</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>680 mg/l, 2 Hours</td>
<td>Mouse</td>
<td>Butane (CAS 106-97-8)</td>
<td>Inhalation LC50</td>
</tr>
<tr>
<td>658 mg/l, 4 Hours</td>
<td>Rat</td>
<td>Butane (CAS 106-97-8)</td>
<td>Inhalation LC50</td>
</tr>
</tbody>
</table>

#### Skin corrosion/irritation
May cause skin burns.

#### Serious eye damage/eye irritation
Based on available data, the classification criteria are not met.

#### Respiratory or skin sensitization

- **Respiratory sensitization**: Based on available data, the classification criteria are not met.
- **Skin sensitization**: Based on available data, the classification criteria are not met.

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915345     Version #: 02     Revision date: 23-May-2014     Print date: 23-May-2014
Germ cell mutagenicity  May cause genetic defects.
Carcinogenicity  May cause 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.

12. Ecological information

Ecotoxicity  The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability  Not available.
Bioaccumulative potential  Not available.
Partition coefficient n-octanol / water (log Kow)
- Butane (CAS 106-97-8) 2.89
- Isobutane (CAS 75-28-5) 2.76
Mobility in soil  Not available.
Other adverse effects  Not available.

13. Disposal considerations

Disposal instructions  Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. Do not discharge into drains, water courses or onto the ground.
Hazardous waste code  Waste codes should be assigned by the user based on the application for which the product was used.
Waste from residues / unused products  Dispose of in accordance with local regulations.
Contaminated packaging  Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
- UN number  UN1964
- UN proper shipping name  Hydrocarbon gas mixture, compressed, n.o.s. (Isobutane, Butane)
- Transport hazard class(es)  2.1
- Class  2.1
- Subsidiary risk  -
- Packing group  Not applicable.
- Environmental hazards  No
- Marine pollutant  No
- Special precautions for user  Not applicable.
- Packaging exceptions  306
- Packaging non bulk  302
- Packaging bulk  314, 315

IATA
- UN number  UN1964
- UN proper shipping name  Hydrocarbon gas mixture, compressed, n.o.s. (Isobutane, Butane)
- Transport hazard class(es)  2.1
- Class  2.1
- Subsidiary risk  -
- Label(s)  2.1
- Packing group  Not applicable.
- Environmental hazards  No
- ERG Code  10L
- Special precautions for user  Not available.

IMDG
- UN number  UN1964
Hydrocarbon gas mixture, compressed, n.o.s. (Isobutane, Butane)

**UN proper shipping name**

**Transport hazard class(es)**

- **Class**: 2.1
- **Subsidiary risk**: -
- **Label(s)**: 2.1

**Packing group**

Not applicable.

**Environmental hazards**

- **Marine pollutant**: No
- **EmS**: F-D, S-U

**Special precautions for user**

Not available.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC 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.
  - Not listed.
- **CERCLA Hazardous Substance List (40 CFR 302.4)**
  - Butane (CAS 106-97-8) LISTED
  - Isobutane (CAS 75-28-5) LISTED

**Superfund Amendments and Reauthorization Act of 1986 (SARA)**

- **Hazard categories**
  - Immediate Hazard: No
  - Delayed Hazard: No
  - Fire Hazard: No
  - Pressure Hazard: No
  - 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**
  - Not regulated.
- **Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)
- **Safe Drinking Water Act (SDWA)**
  - Not regulated.
- **Food and Drug Administration (FDA)**
  - Total food additive
  - Direct food additive
  - GRAS food additive

**US state regulations**

- WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.
- **US. Massachusetts RTK - Substance List**
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)
- **US. New Jersey Worker and Community Right-to-Know Act**
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)
- **US. Pennsylvania Worker and Community Right-to-Know Law**
  - Butane (CAS 106-97-8)
  - Isobutane (CAS 75-28-5)
US. Rhode Island RTK
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>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).

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

1 4 0

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
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