SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Name of the substance: Propane Propylene/Butane Butylene
Identification number: -
Registration number: -
Synonyms: Olefins
SDS number: 2025
Issue date: 27-July-2011
Version number: 05
Revision date: 24-July-2013
Supersedes date: 17-August-2012

1.2. Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Refinery feedstock.
Uses advised against: None known.

1.3. Details of the supplier of the safety data sheet
Supplier:
Company name: Valero Energy Ltd
Address: 1 Westferry Circus
London E14 4HA
UK
Telephone: 01/210 345 4593 (General information; US)
e-mail: CorpHSE@valero.com
Contact person: Industrial Hygienist

1.4. Emergency telephone number: 0044/(0)18 65 407333

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification according to Directive 67/548/EEC or 1999/45/EC as amended
Classification:
- F+;R12, Carc. Cat. 1;R45, Muta. Cat. 2;R46

Classification according to Regulation (EC) No 1272/2008 as amended
- Flammable gases: Category 1 - H220 - Extremely flammable gas.
- Gases under pressure: Compressed gas - H280 - Contains gas under pressure; may explode if heated.

Health hazards:
- Germ cell mutagenicity: Category 1B - H340 - May cause genetic defects.
- Carcinogenicity: Category 1A

Hazard summary
Physical hazards: Extremely flammable.
Health hazards: May cause cancer. May cause heritable genetic damage. May cause harm to the unborn child. Not classified for health hazards. However, occupational exposure to the mixture or substance(s) may cause adverse health effects.
Environmental hazards: Not classified for hazards to the environment.
Specific hazards: Not available.
Main symptoms: Not available.

2.2. Label elements
Label according to Regulation (EC) No. 1272/2008 as amended
Contains: Distillates (petroleum), C6-rich, Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed
Identification number: -
Hazard pictograms

Signal word

Hazard statements
H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.
H340 - May cause genetic defects.
H350 - May cause cancer.

Precautionary statements

Prevention
P201 - Obtain special instructions before use.
P281 - Use personal protective equipment as required.
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Response
P308 + P313 - IF exposed or concerned: Get medical advice/attention.

Storage
P410 + P403 - Protect from sunlight. Store in a well-ventilated place.

Disposal
P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Supplemental label information
Not applicable.

2.3. Other hazards
Static accumulator - Static accumulating flammable materials can become electrostatically charged even in bonded and grounded equipment. Sparks may ignite material and vapor may cause flash fire (or explosion).

SECTION 3: Composition/information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>%</th>
<th>CAS-No. / EC No.</th>
<th>REACH Registration No.</th>
<th>INDEX No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed</td>
<td>&lt;100</td>
<td>68477-83-8, 270-765-5</td>
<td>-</td>
<td>649-067-00-3</td>
<td></td>
</tr>
<tr>
<td>Classification:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSD:</td>
<td>F+,R12, Carc. Cat. 1;R45, Muta. Cat. 2;R46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLP:</td>
<td>Flam. Gas 1;H220, Press. Gas;H280, Muta. 1B,H340, Carc. 1A,H350</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distillates (petroleum), C6-rich</td>
<td>0.1 - 0.99</td>
<td>93165-19-6, 296-903-4</td>
<td>-</td>
<td>649-388-00-9</td>
<td></td>
</tr>
<tr>
<td>Classification:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSD:</td>
<td>F+,R12, Carc. Cat. 2;R45, Muta. Cat. 2;R46, Repr. Cat. 3;R62-63, Xn;R65, Xi;R38, R67, N;R51/53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLP:</td>
<td>Flam. Liq. 1;H224, Asp. Tox. 1;H304, Skin Irrit. 2;H315, STOT SE 3;H336, Muta. 1B,H340, Carc. 1B;H350, Repr. 2;H361fd, Aquatic Chronic 2;H411</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION 4: First aid measures

General information
Not available.

4.1. Description of 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.

4.2. Most important symptoms and effects, both acute and delayed
Contact with liquefied gas may cause frostbite.

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

SECTION 5: Firefighting measures

General fire hazards
Extremely flammable gas. Containers may explode when heated.
5.1. Extinguishing media
Suitable extinguishing media

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

5.2. Special hazards arising from the substance or mixture
Vapor may cause flash fire. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

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

Special fire fighting procedures
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. Vapours may form explosive air mixtures even at room temperature. Prevent buildup of vapours or gasses to explosive concentrations. Some of these materials, if spilled, may evaporate leaving a flammable residue. Water runoff can cause environmental damage.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
For non-emergency personnel
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 for personal protective equipment.

For emergency responders
Keep unnecessary personnel away. Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. 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.

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

6.4. Reference to other sections
For personal protection, see section 8 of the SDS. For waste disposal, see section 13 of the SDS.

SECTION 7: Handling and storage

7.1. 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, or on clothing. Use only with adequate ventilation.

7.2. 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.

7.3. Specific end use(s)
Refinery feedstock.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
Occupational exposure limits
No exposure limits noted for ingredient(s).

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

Recommended monitoring procedures
Not available.

Derived no-effect level (DNEL)
Not available.

Predicted no effect concentrations (PNECs)
Not available.

8.2. Exposure controls
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

**General information**
Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment. Contact with liquefied gas might cause frostbites, in some cases with tissue damage.

**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.

**Hygiene measures**
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.

**Environmental exposure controls**
Not available.

SECTION 9: Physical and chemical properties

**9.1. Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Colorless liquefied gas.</td>
</tr>
<tr>
<td><strong>Physical state</strong></td>
<td>Liquid.</td>
</tr>
<tr>
<td><strong>Form</strong></td>
<td>Compressed liquefied gas.</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>Colorless</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>Hydrocarbon.</td>
</tr>
<tr>
<td><strong>Odour threshold</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Melting point/freezing point</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Initial boiling point and boiling range</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>-108.0 °C (-162.4 °F)</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Upper/lower flammability or explosive limits</strong></td>
<td>1.6 % &lt;br&gt; 12 %</td>
</tr>
<tr>
<td><strong>Flammability limit - lower (%)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Flammability limit - upper (%)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Vapour density</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Relative density</strong></td>
<td>0.56 (15°C)</td>
</tr>
<tr>
<td><strong>Solubility(ies)</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Partition coefficient</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>(n-octanol/water)</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Decomposition temperature</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Explosive properties</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Oxidizing properties</strong></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>9.2. Other information</strong></td>
<td>No relevant additional information available.</td>
</tr>
</tbody>
</table>

SECTION 10: Stability and reactivity

**10.1. Reactivity**
Not available.

**10.2. Chemical stability**
Stable under normal temperature conditions and recommended use.

**10.3. Possibility of hazardous reactions**
Polymerization will not occur.
10.4. Conditions to avoid
In a fire or if heated, a pressure increase will occur and the container may burst or explode.

10.5. Incompatible materials

10.6. Hazardous
decomposition products
None known.

SECTION 11: Toxicological information

General information
Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Information on likely routes of exposure

Ingestion
Not applicable.

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
Exposure to rapidly expanding gas or vapourizing liquid may cause frostbite ("cold burn").

11.1. 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 vapourizing liquid may cause frostbite ("cold burn").

Skin corrosion/irritation
Not assigned.

Serious eye damage/eye irritation
Not assigned.

Respiratory sensitisation
Not assigned.

Skin sensitisation
Not available.

Germ cell mutagenicity
May cause genetic defects.

Carcinogenicity
May cause cancer.

Reproductive toxicity
The product contains a small amount of substance that is suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure
Not assigned.

Specific target organ toxicity - repeated exposure
Not assigned.

Aspiration hazard
Not applicable.

Mixture versus substance information
Not available.

Other information
Not available.

SECTION 12: Ecological information

12.1. Toxicity
The product contains a substance which is toxic to aquatic organisms and which may cause long-term adverse effects in the aquatic environment.

12.2. Persistence and degradability
Not available.

12.3. Bioaccumulative potential
Not available.

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

Bioconcentration factor (BCF)
Not available.

12.4. Mobility in soil
Not available.

12.5. Results of PBT and vPvB assessment
Not a PBT or vPvB substance or mixture.

12.6. Other adverse effects
Not available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Residual waste
Dispose of in accordance with local regulations.

Contaminated packaging
Since emptied containers may retain product residue, follow label warnings even after container is emptied.

EU waste code
16 05 04*
DISPOSAL METHODS/INFORMATION
Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste. Do not discharge into drains, water courses or onto the ground.

SECTION 14: TRANSPORT INFORMATION

ADR
14.1. UN number UN1964
14.2. UN proper shipping name HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.
14.3. Transport hazard class(es) 2.1
14.4. Packing group -
14.5. Environmental hazards Not available.
14.6. Special precautions for user Not available.

RID
14.1. UN number UN1964
14.2. UN proper shipping name HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.
14.3. Transport hazard class(es) 2.1
14.4. Packing group Not available.
14.5. Environmental hazards Not available.
14.6. Special precautions for user Not available.

ADN
14.1. UN number UN1964
14.2. UN proper shipping name Hydrocarbon Gas Compressed, N.o.s.
14.3. Transport hazard class(es) Not available.
14.4. Packing group Not available.
14.5. Environmental hazards Not available.
14.6. Special precautions for user Not available.

IATA
14.1. UN number UN1964
14.2. UN proper shipping name Hydrocarbon gas mixture, compressed, n.o.s.
14.3. Transport hazard class(es) 2.1
14.4. Packing group Not available.
14.5. Environmental hazards Not available.
14.6. Special precautions for user Not available.

IMDG
14.1. UN number UN1964
14.2. UN proper shipping name HYDROCARBON GAS MIXTURE, COMPRESSED, N.O.S.
14.3. Transport hazard class(es) 2.1
14.4. Packing group Not available.
14.5. Environmental hazards Marine pollutant No
14.6. Special precautions for user Not available.

EMERGENCY RESPONSE DATA

ERG CODE/EMERGENCY INFORMATION

F-D, S-U
14.6. Special precautions for user

This product is a compressed or liquefied gas and when transported in bulk is covered under IGC code.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

EU regulations

- Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I
  Not listed.
- Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II
  Not listed.
  Not listed.
- Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 1 as amended
  Not listed.
- Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 2 as amended
  Not listed.
- Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex I, part 3 as amended
  Not listed.
- Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals, Annex V as amended
  Not listed.
- Regulation (EC) No. 166/2006 Annex II Pollutant Release and Transfer Registry
  Not listed.
- Regulation (EC) No. 1907/2006, REACH Article 59(1) Candidate List as currently published by ECHA
  Not listed.

Authorisations

- Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended
  Not listed.

Restrictions on use

- Regulation (EC) No. 1907/2006, REACH Annex XVII Substances subject to restriction on marketing and use as amended
  Distillates (petroleum), C6-rich (CAS 93165-19-6)
  Not regulated.
- Directive 2004/37/EC: on the protection of workers from the risks related to exposure to carcinogens and mutagens at work
  Not regulated.
- Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breastfeeding
  Distillates (petroleum), C6-rich (CAS 93165-19-6)
  Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed (CAS 68477-83-8)

Other EU regulations

- Directive 96/82/EC (Seveso II) on the control of major-accident hazards involving dangerous substances
  Not regulated.
- Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work
  Distillates (petroleum), C6-rich (CAS 93165-19-6)
  Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed (CAS 68477-83-8)
- Directive 94/33/EC on the protection of young people at work
  Distillates (petroleum), C6-rich (CAS 93165-19-6)
  Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed (CAS 68477-83-8)

National regulations

- Not available.

15.2. Chemical safety assessment

Chemical Safety Assessment has been carried out.

Annex for Exposure Scenarios is not required for this material.
SECTION 16: Other information

List of abbreviations

- DSD: Directive 67/548/EEC.
- DNEL: Derived No-Effect Level.
- PNEC: Predicted No-Effect Concentration.
- PBT: Persistent, bioaccumulative and toxic.
- vPvB: Very Persistent and very Bioaccumulative.

References

Not available.

Information on evaluation method leading to the classification of mixture

The mixture is classified based on test data for physical hazards. The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details, refer to Sections 9, 11 and 12.

Full text of any statements or R-phrases and H-statements under Sections 2 to 15

- R12 Extremely flammable.
- R38 Irritating to skin.
- R45 May cause cancer.
- R46 May cause heritable genetic damage.
- R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- R61 May cause harm to the unborn child.
- R62 Possible risk of impaired fertility.
- R63 Possible risk of harm to the unborn child.
- R65 Harmful: may cause lung damage if swallowed.
- R67 Vapours may cause drowsiness and dizziness.
- H220 Extremely flammable gas.
- H224 Extremely flammable liquid and vapour.
- H280 Contains gas under pressure; may explode if heated.
- H304 May be fatal if swallowed and enters airways.
- H315 Causes skin irritation.
- H336 May cause drowsiness or dizziness.
- H340 May cause genetic defects.
- H350 May cause cancer.
- H361fd Suspected of damaging fertility. Suspected of damaging the unborn child.
- H411 Toxic to aquatic life with long lasting effects.

This SDS contains revisions in the following section(s):

This safety data sheet contains revisions in the following section(s): 2, 3, 7, 11, 12.

Training information

Not available.

Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with EC No 1272/2008 by Valero Energy Ltd. Valero Energy Ltd. 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.