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

1.1. Product identifier
Name of the substance: Isobutane
Identification number: 75-28-5
Registration number: 01-2119485395-27-0017
Synonyms: None.
SDS number: 2018
Issue date: 27-July-2011
Version number: 05
Revision date: 06-August-2013
Supersedes date: 17-August-2012

1.2. Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Fuel.
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
Canary Wharf
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

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

Hazard summary
Physical hazards: Extremely flammable.
Health hazards: 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
Identification number: 75-28-5

Signal word: Danger
Hazard statements
H220 - Extremely flammable gas.
H280 - Contains gas under pressure; may explode if heated.

Precautionary statements
Prevention
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Response
P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
Storage
P410 - Protect from sunlight.
P403 - Store in a well-ventilated place.
Disposal
Not assigned.

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>
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<td>75-28-5</td>
<td>200-857-2</td>
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Classification:
DSD: F+, R12
CLP: Flam. Gas 1; H220, Press. Gas; H280

SECTION 4: First aid measures

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

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 discolouration 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, 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)
Fuel.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits

Austria. MAK List

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<td>800 ppm</td>
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Estonia. OELs. Occupational Exposure Limits of Hazardous Substances. (Annex of Regulation No. 293 of 18 September 2001)

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Finland. Workplace Exposure Limits

<table>
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<th>Value</th>
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<tr>
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<td>Components</td>
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**Germany. TRGS 900, Limit Values in the Ambient Air at the Workplace**

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**Italy. OELs**

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**Latvia. OELs. Occupational exposure limit values of chemical substances in work environment**

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**Portugal. VLEs. Norm on occupational exposure to chemical agents (NP 1796)**

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**Romania. OELs. Protection of workers from exposure to chemical agents at the workplace**

<table>
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<tr>
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<td>TWA</td>
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**Slovenia. OELs. Regulations concerning protection of workers against risks due to exposure to chemicals while working (Official Gazette of the Republic of Slovenia)**

<table>
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**Spain. Occupational Exposure Limits**

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**Switzerland. SUVA Grenzwerte am Arbeitsplatz**

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<td>1200 ppm</td>
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<tr>
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<td>3200 ppm</td>
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</table>

### 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

**Appearance**
Colorless liquefied gas.

**Physical state**
Gas.

**Form**
Compressed liquefied gas.

**Colour**
Colorless

**Odour**
Odourless.

**Odour threshold**
Not available.

**pH**
Not available.

**Melting point/freezing point**
-159,4 °C (-254,92 °F) Typical.

**Initial boiling point and boiling range**
-12 °C (10,4 °F)

**Flash point**
-118,0 °C (-180,4 °F) Pensky-Martens Closed Cup

**Evaporation rate**
Not available.

**Flammability (solid, gas)**
Not available.

**Upper/lower flammability or explosive limits**
- Flammability limit - lower (%)
  1,8 %
- Flammability limit - upper (%)
  8,4 %

**Vapour pressure**
Not available.

**Vapour density**
1,6

**Relative density**
0,56 (15°C)

**Solubility(ies)**
Insoluble.

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

**Auto-ignition temperature**
-460 °C (-796 °F)

**Decomposition temperature**
Not available.

**Viscosity**
Not available.

**Explosive properties**
Not available.

**Oxidizing properties**
Not available.

9.2. Other information

**Molecular formula**
C4-H10

**Molecular weight**
58,12 g/mol

**VOC (Weight %)**
100 %

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.
10.6. 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 Not assigned.
Carcinogenicity Not assigned.
Reproductive toxicity Not assigned.
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 Not expected to be harmful to aquatic organisms.
12.2. Persistence and degradability Not available.
12.3. Bioaccumulative potential 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 05 01 99
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 UN1969
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14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

This substance/mixture is not intended to be transported in bulk.

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
  Not listed.
- 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
  Not regulated.

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
  Not listed.
- Directive 94/33/EC on the protection of young people at work
  Not listed.

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.
R12 Extremely flammable.

H220 Extremely flammable gas.
H280 Contains gas under pressure; may explode if heated.

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

Not available.

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