

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

#### 1.1. Product identifier

|                        |                      |
|------------------------|----------------------|
| Chemical type          | : Substance          |
| Substance name         | : Butane             |
| Trade name             | : Butane             |
| EC index no            | : 601-004-01-8       |
| EC no                  | : 203-448-7          |
| CAS No.                | : 106-97-8           |
| REACH registration No. | : Not applicable     |
| Product code           | : 61E, SDS # PbR0045 |
| Synonyms               | : None known.        |

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

##### 1.2.1. Relevant identified uses

|                                  |  |
|----------------------------------|--|
| Use of the substance/preparation | : Manufacture of substances<br>Formulation [mixing] of preparations and/or re-packaging<br>Polymer preparations and compounds<br>Fuels<br>Functional fluids<br>Blowing agent<br>Propellant gas |
|----------------------------------|--|

##### 1.2.2. Uses advised against

No additional information available

#### 1.3. Details of the supplier of the safety data sheet

Petrobras International Braspetro B.V. – PIB BV  
Prins Bernhardplein 200, 1097 – JB Amsterdam  
The Netherlands

All communications shall be addressed exclusively to the following address:

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Fax number: +44(0) 20 7355 8750  
E-mail: reach@petrobras.com.br

#### 1.4. Emergency telephone number

|                  |  |
|------------------|--|
| Emergency number | : For Chemical Emergency, Spill, Leak, Fire, Exposure or Accident Call CHEMTREC Day or Night<br>Within USA and Canada: 1-800-424-9300<br>Outside USA and Canada (collect calls accepted): 1-703-527-3887 |
|------------------|--|

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification according to Regulation (EC) No. 1272/2008 [CLP]

|                |      |
|----------------|------|
| Flam. Gas 1    | H220 |
| Compressed gas | H280 |
| Muta. 1B       | H340 |
| Carc. 1A       | H350 |

Full text of H-phrases: see section 16.

##### Classification according to Directive 67/548/EEC or 1999/45/EC

Carc.Cat.1; R45  
Muta.Cat.2; R46  
F+; R12

Full text of R-phrases: see section 16.

##### Adverse physicochemical, human health and environmental effects

Contact with product may cause cold burns or frostbite. Asphyxiant in high concentrations. This material or its emissions may alter blood formation within marrow and thereby aggravate existing bone marrow disease.

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according to Regulation (EC) No. 453/2010

### 2.2. Label elements

#### Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP) :



GHS02

GHS04

GHS08

Signal word (CLP) :

Danger

Hazard statements (CLP) :

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

Precautionary statements (CLP) :

P202 - Do not handle until all safety precautions have been read and understood  
P281 - Use personal protective equipment as required  
P308+P313 - IF exposed or concerned: Get medical advice/attention  
P381 - In case of leaking gas fire, eliminate all ignition sources if safe to do so.  
P405 - Store locked up  
P410+P403 - Protect from sunlight. Store in a well-ventilated place

### 2.3. Other hazards

This substance/mixture does not meet the PBT/vPvB criteria of REACH, annex XIII.

other hazards which do not result in classification

: Contact with product may cause cold burns or frostbite. In high concentrations may cause asphyxiation. Contributes to the formation of photochemical smog by degradation in the atmosphere through photochemical reactions to form photochemical oxidants and interfering with the photochemical cycle of nitrogen oxides.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

| Name                                       | Product identifier  | %   | Classification according to Directive 67/548/EEC                |
|--|---|-----|---|
| Butane (containing >= 0,1 % 1,3-butadiene) | (CAS No.) 106-97-8<br>(EC no) 203-448-7<br>(EC index no) 601-004-01-8 | 100 | F+; R12<br>Carc.Cat.1; R45<br>Muta.Cat.2; R46                   |
| Name                                       | Product identifier  | %   | Classification according to Regulation (EC) No. 1272/2008 [CLP] |
| Butane (containing >= 0,1 % 1,3-butadiene) | (CAS No.) 106-97-8<br>(EC no) 203-448-7<br>(EC index no) 601-004-01-8 | 100 | Flam. Gas 1, H220<br>Muta. 1B, H340<br>Carc. 1A, H350           |

Full text of R-, H- and EUH-phrases: see section 16.

### 3.2. Mixtures

Not applicable

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general : Put victim at rest, cover with a blanket and keep warm. Do not give an unconscious person anything to drink.

First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. In case of breathing difficulties administer oxygen. Give artificial respiration if necessary. Seek medical advice.

First-aid measures after skin contact : May cause frostbite. After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water. Seek medical advice.

First-aid measures after eye contact : Rinse immediately and plentifully with water, also under the eyelids, for at least 20 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek immediate medical advice.

First-aid measures after ingestion : not applicable.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : Harmful by inhalation. Asphyxiant gas. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.

Symptoms/injuries after skin contact : Contact with product may cause cold burns or frostbite.

Symptoms/injuries after eye contact : Contact with product may cause cold burns or frostbite.

Symptoms/injuries after ingestion : Ingestion is not considered a potential route of exposure.

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

Treat symptomatically.

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according to Regulation (EC) No. 453/2010

### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

- Suitable extinguishing media: : carbon dioxide (CO<sub>2</sub>), dry chemical powder, foam. Water spray.  
Unsuitable extinguishing media : Do not use water jet. Do not aim water directly at point where compressed gas is escaping, as the water may freeze.

#### 5.2. Special hazards arising from the substance or mixture

- Fire hazard : Extremely flammable gas. Contains gas under pressure; may explode if heated.  
Explosion hazard : Formation of potentially explosive mixtures with: Air. Oxidizing agents. Direct sunlight. Chlorine (Cl<sub>2</sub>).  
Reactivity : Hazardous combustion products. Carbon dioxide. Carbon monoxide. Nitrogen oxides (NO<sub>x</sub>).

#### 5.3. Advice for firefighters

- Firefighting instructions : In case of fire: Wear self-contained breathing apparatus. Wear protective gloves/protective clothing.  
Other information : Cool containers / tanks with spray water if possible. In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

- General measures : Evacuate personnel to a safe area. Under fire conditions closed containers may rupture or explode. Remove product from area of fire. Eliminate leaks immediately.

##### 6.1.1. For non-emergency personnel

- Protective equipment : Refer to section 8.  
Emergency procedures : This product is flammable. Remove all sources of ignition. Do not handle until all safety precautions have been read and understood.

##### 6.1.2. For emergency responders

- Protective equipment : Refer to section 8.

#### 6.2. Environmental precautions

Use water spray to minimise or disperse vapours. In case of insufficient ventilation and/or through use, explosive/highly flammable mixtures may develop.

#### 6.3. Methods and material for containment and cleaning up

- For containment : Stop leak if safe to do so. Ventilate affected area.  
Methods for cleaning up : Stop leak if safe to do so. Ventilate affected area.  
Other information : Remove all sources of ignition.

#### 6.4. Reference to other sections

Refer to sections 8 and 13.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

- Precautions for safe handling : Handle in accordance with good industrial hygiene and safety procedures. Proper grounding procedures to avoid static electricity should be followed. Ground/bond container and receiving equipment. Use only non-sparking tools. Avoid contact with skin, eyes and clothing.

#### 7.2. Conditions for safe storage, including any incompatibilities

- Technical measures: : Use explosion-proof ventilating equipment. Use only in well-ventilated areas.  
Storage condition(s) : Only use containers approved for especially this product. Protect containers against damage. Keep container tightly closed. Protect from sunlight. Store in a well-ventilated place. Keep cool.  
Incompatible materials : Chlorine (Cl<sub>2</sub>). Protect from sunlight.  
Maximum storage period : 6 months  
Storage area : Keep only in the original container in a cool, well-ventilated place. Keep out of direct sunlight. Floors should be impenetrable, resistant to liquids and easy to clean.

#### 7.3. Specific end use(s)

No additional information available

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

| Butane (containing $\geq 0,1\%$ 1,3-butadiene) (106-97-8) |   |                        |
|---|---|------------------------|
| Austria   | MAK (mg/m <sup>3</sup> )                  | 1900 mg/m <sup>3</sup> |
| Austria   | MAK (ppm)                                 | 800 ppm                |
| Austria   | MAK Short time value (mg/m <sup>3</sup> ) | 3800 mg/m <sup>3</sup> |

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| <b>Butane (containing &gt;= 0,1 % 1,3-butadiene) (106-97-8)</b> |   |                        |
|---|---|------------------------|
| Austria   | MAK Short time value (ppm)                                      | 1600 ppm               |
| France  | VME (mg/m <sup>3</sup> )  | 1900 mg/m <sup>3</sup> |
| France  | VME (ppm)   | 800 ppm                |
| Germany   | TRGS 900 Occupational exposure limit value (mg/m <sup>3</sup> ) | 2400 mg/m <sup>3</sup> |
| Germany   | TRGS 900 Occupational exposure limit value (ppm)                | 1000 ppm               |
| Italy - Portugal - USA ACGIH                                    | ACGIH TWA (ppm)   | 1000 ppm               |
| Spain   | VLA-ED (mg/m <sup>3</sup> )                                     | 1935 mg/m <sup>3</sup> |
| Spain   | VLA-ED (ppm)  | 800 ppm                |
| Switzerland   | VME (mg/m <sup>3</sup> )  | 1900 mg/m <sup>3</sup> |
| Switzerland   | VME (ppm)   | 800 ppm                |
| United Kingdom  | WEL TWA (mg/m <sup>3</sup> )                                    | 1450 mg/m <sup>3</sup> |
| United Kingdom  | WEL TWA (ppm)   | 600 ppm                |
| United Kingdom  | WEL STEL (mg/m <sup>3</sup> )                                   | 1810 mg/m <sup>3</sup> |
| United Kingdom  | WEL STEL (ppm)  | 750 ppm                |
| Canada (Quebec)   | VEMP (mg/m <sup>3</sup> )                                       | 1900 mg/m <sup>3</sup> |
| Canada (Quebec)   | VEMP (ppm)  | 800 ppm                |
| Australia   | TWA (mg/m <sup>3</sup> )  | 1450 mg/m <sup>3</sup> |
| Australia   | TWA (ppm)   | 600 ppm                |
| Australia   | STEL (mg/m <sup>3</sup> )                                       | 1810 mg/m <sup>3</sup> |
| Australia   | STEL (ppm)  | 750 ppm                |

### 8.2. Exposure controls

|                                  |   |
|----------------------------------|---|
| Appropriate engineering controls | : Use explosion-proof ventilating equipment. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.   |
| Hand protection                  | : Protective gloves made of PVC.  |
| Eye protection                   | : Chemical goggles or safety glasses. Don't wear contact lenses.  |
| Skin and body protection         | : Wear suitable protective clothing.  |
| Respiratory protection           | : An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. In case of insufficient ventilation, wear suitable respiratory equipment. |

## SECTION 9: Physical and chemical properties

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

|   |  |
|---|--|
| Physical state                            | : Gas  |
| Appearance                                | : Colourless gas.  |
| Colour                                    | : colourless.  |
| Odour                                     | : characteristic. rotten eggs.   |
| Odour threshold                           | : No data available  |
| pH  | : No data available  |
| Melting point                             | : No data available  |
| Solidification point                      | : No data available  |
| Boiling point                             | : -0.5 °C  |
| Flash point                               | : -60 °C (Closed cup)  |
| Relat. evapor. rate comp. to butylacetate | : No data available  |
| Flammability (solid, gas)                 | : No data available  |
| Explosive limits                          | : 1.8-8.4 vol %  |
| Vapour pressure                           | : 2 atm @ 18.8°C   |
| Relative vapour density at 20 °C          | : 2.05   |
| Relative density                          | : 0.58 g/cm <sup>3</sup>   |
| Solubility                                | : Soluble in ether. Soluble in chloroform. Soluble in alcohols.<br>Water: > 50 g/100ml |
| Log Pow                                   | : No data available  |
| Self ignition temperature                 | : No data available  |
| Decomposition temperature                 | : No data available  |
| Viscosity, kinematic                      | : No data available  |
| Viscosity, dynamic                        | : No data available  |
| Explosive properties                      | : No data available  |
| Oxidising properties                      | : No data available  |

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### 9.2. Other information

Gas group : Compressed gas

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

Hazardous combustion products. Carbon dioxide. Carbon monoxide. Nitrogen oxides (NOx).

### 10.2. Chemical stability

Stable at normal conditions.

### 10.3. Possibility of hazardous reactions

Explosive with contact with : oxygen. nickel tetracarbonyl, tetracarbonylnickel.

### 10.4. Conditions to avoid

Protect from direct sunlight. Chlorine (Cl<sub>2</sub>).

### 10.5. Incompatible materials

Oxidizing agents. Oxygen. nickel tetracarbonyl, tetracarbonylnickel.

### 10.6. Hazardous decomposition products

On heating/burning: release of (highly) toxic gases/vapours e.g.: carbon monoxide - carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity : Not classified

#### Butane (106-97-8)

|  |                                 |
|--|---------------------------------|
| LC50 inhalation rat (mg/l)                         | 1237 mg/l/2h                    |
| Skin corrosion/irritation                          | : Not classified (Lack of data) |
| Serious eye damage/irritation                      | : Not classified (Lack of data) |
| Respiratory or skin sensitisation                  | : Not classified (Lack of data) |
| Germ cell mutagenicity                             | : May cause genetic defects.    |
| Carcinogenicity                                    | : May cause cancer.             |
| Reproductive toxicity                              | : Not classified                |
| Specific target organ toxicity (single exposure)   | : Not classified                |
| Specific target organ toxicity (repeated exposure) | : Not classified                |

#### Butane (106-97-8)

|   |   |
|---|---|
| NOAEL (inhalation, rat, gas, 14 days)               | > 4000 ppmV/6h/day  |
| Aspiration hazard                                   | : Not classified (Lack of data)   |
| Potential Adverse human health effects and symptoms | : Contact with product may cause cold burns or frostbite. Asphyxiant in high concentrations. This material or its emissions may alter blood formation within marrow and thereby aggravate existing bone marrow disease.   |
| Other information                                   | : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Contact with liquefied gas may cause frostbite. May cause heritable genetic damage. May cause cancer. Animal experiments indicate reproductive toxicity. |

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general : Not harmful to aquatic organisms.  
Ecology - air : Contributes to the formation of photochemical smog by degradation in the atmosphere through photochemical reactions to form photochemical oxidants and interfering with the photochemical cycle of nitrogen oxides.

#### Butane (106-97-8)

|               |                       |
|---------------|-----------------------|
| LC50 fishes   | > 24.11 mg/l 96 hours |
| EC50 Daphnia  | > 14.22 mg/l 48 hours |
| ErC50 (algae) | > 7.71 mg/l 96 hours  |

### 12.2. Persistence and degradability

#### Butane (106-97-8)

|                               |                           |
|-------------------------------|---------------------------|
| Persistence and degradability | Product is biodegradable. |
|-------------------------------|---------------------------|

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### 12.3. Bioaccumulative potential

#### Butane (106-97-8)

Bioaccumulative potential : not bioaccumulative.

### 12.4. Mobility in soil

#### Butane (106-97-8)

Ecology - soil : No data available.

### 12.5. Results of PBT and vPvB assessment

#### Butane (106-97-8)

This substance/mixture does not meet the PBT/vPvB criteria of REACH, annex XIII.

### 12.6. Other adverse effects

Other adverse effects : No data available.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste treatment methods : Can be incinerated according to local regulations.

Waste disposal recommendations : Do not re-use empty containers. Handle empty containers with care because residual vapours are flammable.

Additional information : Dispose in a safe manner in accordance with local/national regulations.

## SECTION 14: Transport information

In accordance with ADR / RID / ADN / IMDG / ICAO / IATA

### 14.1. UN number

UN-No. : 1011

### 14.2. UN proper shipping name

Proper shipping name : BUTANE

Transport document description : UN 1011 BUTANE, 2.1, (B/D)

### 14.3. Transport hazard class(es)

Class (UN) : 2

Hazard labels (UN) : 2.1



### 14.4. Packing group

Packing group (UN) : Not applicable

### 14.5. Environmental hazards

Other information : No supplementary information available.

### 14.6. Special precautions for user

#### 14.6.1. Overland transport

Hazard identification number (Kemler No.) : 23

Classification code : 2F

Orange plates :



Tunnel restriction code : B/D

Limited quantities (ADR) : LQ00

Excepted quantities (ADR) : E0

#### 14.6.2. Transport by sea

No additional information available

#### 14.6.3. Air transport

No additional information available

### 14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

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### SECTION 15: Regulatory information

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

##### 15.1.1. EU-Regulations

No ingredients included in the REACH Candidate list

Other regulations, restrictions and prohibition regulations : Compliance with following regulations: Regulation (EC) 1907/2006 as amended. Regulation (EC) 1272/2008 as amended. Directive 1999/45/EC as amended. Directive 67/548/EEC as amended.

##### 15.1.2. National regulations

No additional information available

#### 15.2. Chemical safety assessment

CSA has not been completed.

### SECTION 16: Other information

Sources of Key data : PETROBRAS. MSDS.

Abbreviations and acronyms : SDS - Safety Data Sheet . CLP - Classification, Labelling and Packaging. ASTM - American Society for Testing and Materials . CSR - Chemical Safety Report. EC - European Community. EEC - European Economic Community. GHS - Globally Harmonised System. REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals.

Full text of R-, H- and EUH-phrases:

|                |   |
|----------------|---|
| Carc. 1A       | Carcinogenicity Category 1A                               |
| Compressed gas | Gases under pressure Compressed gas                       |
| Flam. Gas 1    | Flammable gases Category 1                                |
| Muta. 1B       | flammable liquids Category 1 flammable liquids Category 3 |
| H220           | Extremely flammable gas                                   |
| H280           | Contains gas under pressure; may explode if heated        |
| H340           | May cause genetic defects                                 |
| H350           | May cause cancer  |
| R12            | Extremely flammable.                                      |
| R45            | May cause cancer.   |
| R46            | May cause heritable genetic damage.                       |

#### SDS PETROBRAS USES

*The information presented in this Safety Data Sheet is based on current knowledge and is believed to be complete and accurate. It describes the product for the purposes of health, safety and environment requirements only and shall, therefore, be used only as a guide. The data refers to a specific product and may not be valid for combined uses with other products. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. Petrobras shall not be responsible for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices.*