MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE / PREPARATION AND OF THE COMPANY

PRODUCT NAME

BUTANE

CAS No: 106-97-8
EINICS No: 270-990-9

NAME AND ADDRESS OF MANUFACTURER/SUPPLIER

ConocoPhillips Ltd, Humber Refinery, South Killingholme, North Lincolnshire, DN40 3DW.
Telephone No. 01469 555925
Facsimile No. 01469 555143

EMERGENCY CONTACT

ConocoPhillips Ltd. Humber Refinery, South Killingholme, Immingham, North Lincolnshire DN40 3DW.
Health and Safety Emergency Telephone No. 01469 572198 (24 hours)

APPLICATION

Multi-purpose fuel

2. COMPOSITION / INFORMATION ON INGREDIENTS

General : Mixture of normal and isobutane (approx. 90%) with butenes (< 8%), propane (< 2%) and pentane (< 1%).
Butadiene < 0.1%. Ethyl Mercaptan added as a stenching agent (< 50 ppm).

3. HAZARDS IDENTIFICATION

Under normal conditions of storage and use, liquefied petroleum gas will not constitute a health hazard. However, being heavier than air, if released the gas will collect in any confined space and may reach concentrations presenting an asphyxiation or safety hazard. Direct contact of the skin with liquid gas may cause frostbite or cold burns and containers may present a similar hazard when gas is being withdrawn, due to the cooling effect. Handling precautions should be strictly observed.

4. FIRST AID MEASURES

Eyes : In case of cold burns caused by rapidly expanding gas or vaporising liquid, obtain immediate medical attention.

Skin : In case of cold burns caused by rapidly expanding gas or vaporising liquid, obtain immediate medical attention.

Inhalation : In emergency situations use proper respiratory protection to immediately remove the affected victim from exposure. Administer artificial respiration if breathing has stopped. Keep at rest. Call for prompt medical attention.

Ingestion : Not applicable.

Pressure Injection : ALWAYS OBTAIN IMMEDIATE MEDICAL ATTENTION EVEN THOUGH THE INJURY MAY APPEAR MINOR.

5. FIRE-FIGHTING MEASURES

Flammability : Do not attempt to extinguish the fire until the source is shut off.

Fire and Explosion Hazards : Extreme hazard; gas leaks or liquid spills readily form flammable mixtures at temperatures below ambient. Risk of fire or explosion by mechanical impact, friction, sparks, flames or other sources of ignition. Auto refrigeration; drains can be plugged and valves made inoperable by the formation of ice when expanding vapours or vaporising liquid cause temperatures to fall below $0^{o}C$. Vapours settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of escape.
Static discharge; material can accumulate static charges which may cause an incendiary electrical discharge.

Special Fire-Fighting Procedures : To prevent uncontrolled explosive re-ignition, do not extinguish flame at leak. Cut off fuel and /or allow fire to burn out under controlled conditions. Extinguish small residual fires with foam or dry chemical powder. Respiratory and eye protection required for fire-fighting personnel exposed to fumes or smoke. Use water spray to cool equipment.

Hazardous Combustion Products : Smoke, carbon monoxide may be formed in the event of incomplete combustion.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions : See Section 8.

Environmental Precautions :

Land Spill : Eliminate sources of ignition. Shut off source taking normal safety precautions. Warn occupants in downwind areas of fire and explosion hazard. Evacuate endangered people, if necessary. Allow the spill to evaporate; ventilate closed and confined spaces.

Water Spill : Eliminate sources of ignition. Advise occupants and shipping in downwind areas of fires and explosion hazard and warn them to stay clear. Notify port and other relevant authorities. Allow liquid to evaporate from the surface.

7. HANDLING AND STORAGE

Butane is stored under pressure at ambient temperatures or as a refrigerated liquid. The design of pressure vessels, fuel systems, safety devices and the operating procedures must comply with national legislation and with recognised codes of good practice.

Small containers e.g. cylinders of approved design, properly sealed and in good condition, should be stored outdoors or in well ventilated storerooms, at no lower than ground level and must be quickly removable in an emergency. Eliminate all sources of ignition from the storage area. Instruct personnel handling LPG about potential hazards and precautions, and train them in safe handling and emergency procedures.

Load/unload temperature : -15°C to +40°C **Storage temperature** : Ambient to 40°C

Special Precautions
Take precautionary measures against static discharge. Keep all connections for filling/emptying securely closed when not in use. Ensure that only containers/equipment of suitable pressure rating are used. Ensure that the permissible filling ratio for the product is not exceeded.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure limits :

Substance	8-hour TWA	STEL	Source / Other Information
Butane	600 ppm (1450 mgm^{-3})	750 ppm (1810 mgm^{-3})	OES-HSE Occupational Exposure Limits (EH40)

Engineering measures : Use only explosion proof electrical equipment at correct classification (approved by EC Notified Body).

Personal Protection : Frostbite hazard. Protect eyes, hands and skin from exposure. Wear safety glasses with side shields, long sleeves and insulating thermal gloves (EN 374). When concentrations in air may exceed the occupational exposure limit, and where engineering, work practices, or other means of exposure reduction are not adequate, approved respirators (EN 405) may be required, fitted with AX filter(s).

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance :	Colourless liquid	**Odour** :	Strong, sulphurous pungent odour due to stenching agent
Specific Gravity at 15.6°C :	0.56 - 0.59	**pH** :	Not applicable
Vapour Pressure at 20°C :	2.07 bar	**Vapour Density (air=1)** :	2.0
Boiling point, °C :	-12 to 0°C	**Pour Point/Melting Point, °C** :	Not applicable
Flash Point (Closed Cup), °C :	-60°C	**Auto-ignition Temperature, °C** :	450°C
Flammability Limit, in Air, % by Volume :		**LEL** : 1.9	**UEL** : 8.5
Kinematic Viscosity at 15°C, mm^2s^{-1} :		0.3	
Solubility :	Sparingly soluble		

PLEASE NOTE THAT THESE PROPERTIES DO NOT CONSTITUTE A SPECIFICATION.

10. STABILITY AND REACTIVITY

Stability : The product is stable and not subject to polymerisation.

Conditions to avoid : Avoid exposure to extreme heat.

Materials to avoid : Avoid contact with strong oxidising agents such as liquid chlorine.

Hazardous Decomposition Products : Product does not decompose at ambient temperature.

11. TOXICOLOGICAL INFORMATION

The following toxicological assessment is based on a knowledge of the toxicity of the product's component's

HEALTH EFFECTS

On eyes : Exposure to rapidly expanding gas or liquid may cause frostbite (cold burn) and damage the eyes.

On skin : Exposure of skin to liquid or rapidly expanding gas may cause frostbite (cold burn).

By inhalation : Negligible hazard at ambient/normal temperatures. Breathing saturated vapours for a few minutes may be fatal. Saturated vapours can be encountered in confined spaces and/or under conditions of poor ventilation. May cause irritation, breathing failure, coma and death without any warning odour being sensed. Avoid breathing vapours, mists or fumes.

By ingestion : No hazard in normal industrial use.

Chronic : No chronic data available at this time.

Acute : Butane has very similar properties to Propane, a summary of which follows. At very high levels, propane has narcotic and asphyxiating properties and cases of "sudden death" have been documented in which propane and propylene were identified in blood, urine and cerebrospinal fluid. Animal inhalation studies indicate a gas concentration of 89% to be below the anaesthetic level, but to depress the blood pressure of cats. 1% propane causes hemodynamic changes in dogs; 3.3% decreased inotropism of the heart, decreases the mean aortic pressure, stroke volume and cardiac output, and increases pulmonary vascular resistance. in the primate, 10% propane induces some myocardial effects, and 20% aggravation of these parameters and respiratory depression. 10% propane in the mouse and 15% in the dog appear to produce no arrhythmia but weak cardiac sensitization. Ref: Patty's Industrial Hygiene and Toxicology, 3rd Ed, G. Clayton and F. Claytons (ed's), A Wiley-Interscience Publication, Vol. IIB. pp 3181 - 3182

12. ECOLOGICAL INFORMATION

Biodegradability :

In the absence of specific environmental data for this product, this assessment is based on information for hydrocarbon components found in liquefied petroleum gas (LPG). These gases do *not* meet the criteria for classification as dangerous for the environment. LPG released into the environment will evaporate and be dispersed into the atmosphere as a gas. Based on chemical/physical data from the literature, no harmful effects to terrestrial or aquatic habitats would be expected from components in LPG. LPG components have been reported to have short atmospheric half-lives and therefore, would not be expected to persist.

13. DISPOSAL CONSIDERATIONS

The product contains hazardous ingredients listed in Section 2. Collects and dispose of it at an authorised disposal facility, in conformance with national and local; regulations and in accordance with EU Directives on hazardous waste.

14. TRANSPORT INFORMATION

Classification for Transport : Rails cars, tank trucks, cylinders (Special high pressure equipment)

Shipping Name :	Butane	**Packaging Group** :	Not applicable
UN Number :	1011	**Marine Pollutant** :	No
UN Class :	Class 2	**ICAO/IATA** :	Class 2 (b)
ADR/RID :	Class 2 (b)		
IMO/IMDG :	Class 2.1		

15. REGULATORY INFORMATION

Hazard Label Data : Extremely flammable. F+

R & S Phrases :

R12	Extremely flammable
S2	Keep out of reach of children
S9	Keep container in a well ventilated area
S16	Keep away from sources of ignition - NO SMOKING

EC Directives : EC Directive 91 / 155 / EEC

Waste Oil Directive 87 / 101/ EEC

Statutory Information : The Health and Safety at Work Act 1974

Consumer Protection Act 1987

Environmental Protection Act 1990

Control of Substances Hazardous to Health Regulations 2002

Chemicals (Hazard Information and Packaging) Regulations 2002

Dangerous Substances and Explosive Atmospheres Regulations 2002

European Waste Catalogue No : Not applicable

16. OTHER INFORMATION

The data and advice given apply when the product is sold for the stated application or applications. The product is not sold as suitable for any other application. Use of the product for applications other than as stated in this sheet may give rise to risks not mentioned in this Sheet. You should not use the product other than for the stated application or applications.

If you have purchased the product for supply to a third party for use at work, it is your duty to take all necessary steps to ensure that any person handling or using the product is provided with the information in this sheet.

If you are an employer, it is your duty to tell your employees and others or may be affected of any hazards described in this sheet and of any precautions which should be taken.

This data sheet has been revised in sections 1, 2, 8, 12 & 15