

## SIBUR TOBOLSK LLC

### SAFETY DATA SHEET

According to Regulations (EC) 1907/2006 (REACH), (EC) 1272/2008 (CLP) & (EU) 2015/830

## PROPANE-BUTANE MIXTURE

Version: 3.0  
Created: 19/03/2018

### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND COMPANY/UNDERTAKING

#### 1.1. Product identifier

NAME OF MIXTURE:	Propane-butane mixture	
SYNONYMS:	Liquefied petroleum gas, mixture of propane and butane, Hydrocarbons C3-C4	
TRADE NAMES:	Propane-butane mixture	
INGREDIENTS:		
Chemical name	Propane	Butane
Synonyms	dimethyl methane, propyl hydride, petroleum gas	butane, methylethyl methane
Index No (CLP)	601-003-00-5	601-004-00-0
CAS #:	74-98-6	106-97-8
EC #:	200-827-9	203-448-7
REACH REGISTRATION #:	01-2119486944-21-0015	01-2119474691-32-0009

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

##### 1.2.1. Identified use(s)

See Annex 1 to Safety Data Sheet

<b>Industrial</b>	<b>Professional</b>	<b>Consumers</b>
Manufacture of substance	Use as a fuel	Use a fuel
Distribution of substance	Propellants	Propellants
Use as a fuel	Polymer processing	
Blowing agents	Functional fluids	
Formulation and (re)packaging of substances and mixtures		
Polymer production		
Polymer processing		
Functional fluids		
Manufacture of substance		

##### 1.2.2. Uses advised against

The use of the substance should be limited to those specified in Annex 1. Other uses are not recommended unless an assessment is completed, prior to commencement of that use, which demonstrates that the use will be controlled.

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

#### Only representative

Company name: Gazprom Marketing and Trading France sas  
Address: 68 avenue des Champs-Élysées, 75008, Paris, France  
Contact Telephone: +33 1 42 99 73 64  
Fax: +33 1 42 99 73 98  
Email Address: alexandre.bouchon@gazprom-mt.com

#### Manufacturer

Company name: SIBUR Tobolsk LLC  
Address: Promzona, 626150, Tobolsk, Tyumen region, Russian Federation  
Phone: +7 (3456) 266-900  
Fax: +7 (3456) 266-449  
Email Address: office-sibt@tobolsk.sibur.ru

**Emergency phone:** +7 (3456) 398-755, +7 (3456) 398-056 (office hours only)

**1.4. Emergency telephone number:** 112 (Please note that emergency numbers may vary depending upon the country of delivery though 112 remains valid as universal number)

## SECTION 2: HAZARDS IDENTIFICATION

### 2.1. Classification of the substance or mixture

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

##### Physical/Chemical Hazards

Flam. Gas 1 H220: Extremely flammable gas  
Liquefied gas H280: Contains gas under pressure; may explode if heated

##### Health Hazards

Not classified.

##### Environmental hazards

Not classified.

##### Additional hazard classes:

Gases under Pressure: Compressed Gas/ Refrigerated Liquefied Gas / Dissolved Gas

### 2.2. Label elements

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

**Signal word: DANGER**

**Hazard pictogram**



GHS02



GHS04

### Hazard statements

H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

### Precautionary statements

P102: Keep out of reach of children.

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P243: Take actions to prevent static discharges.

P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381: In case of leakage eliminate all ignition sources.

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

### 2.3. Other hazards

#### Assessment PBT / vPvB

According to Annex XIII of Regulation (EC) No.1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH):

- not fulfilling PBT (persistent/bioaccumulative/toxic) criteria;
- not fulfilling vPvB (very persistent/very bioaccumulative) criteria.

#### Thermal hazards

Contact with liquid form may cause frostbite.

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substances

Not applicable

### 3.2. Mixtures:

Name	EC#/ CAS#	REACH Registration #	Index No	Content, %	Classification according to Regulation (EC) 1272/2008 (CLP)
Propane	200-827-9/ 74-98-6	01-2119486944- 21-0015	601-003-00-5	30-98%	H220, H280
Butane	203-448-7/ 106-97-8	01-2119474691- 32-0009	601-004-00-0	2-70%	H220, H280
Iso- butane	200-857-2/ 75-28-5	01-2119485395- 27-0008	601-004-00-0		H220, H280
Hydrogen sulphide	231-977-3/ 7783-06-4		016-001-00-4	0.003	H220, H280, H330, H335, H400

The product does not contain impurities or additives that could affect product's labelling and classification according to Regulation (EC) No 1272/2008 (CLP) in the concentration ranges specified.

Specific Conc. Limits (CLP): not established.

M-factor: 1.

### 3.3. Additional Information

For full text of Hazard statements: see section 16.

## SECTION 4: FIRSTAID MEASURES

### 4.1. Description of first aid measures

#### Product-specific hazards

Extremely flammable liquefied gas.

An asphyxiant at high concentrations – oxygen depletion can be fatal.

Contact with the liquid may result in frostbite.

#### General information

Warning before intervention:

Before attempting to rescue casualties, isolate area from all potential sources of ignition including disconnecting electrical supply.

Ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry into confined spaces.

Take care to self-protect by avoiding becoming contaminated – use approved positive pressure air supplied breathing apparatus with a full facepiece.

Move contaminated patient(s) out of the dangerous area.

Take off all contaminated clothing immediately.

Keep victims warm and at rest, do not leave unattended.

Seek medical assistance - show the safety data sheet or label if possible.

#### Following inhalation

Move victims to fresh air.

Do not leave the victim unattended.

Keep patient warm and at rest. If unconscious place in recovery position.

Seek immediate medical attention.

If breathing is difficult, give oxygen if possible, or assisted ventilation.

In the event of cardiac arrest, (no pulse), apply cardiopulmonary resuscitation.

#### Following skin contact

Do not remove clothing that adheres due to freezing.

Immediately flush affected area with plenty of water – continue for at least 15 minutes.

If there are signs of frostbite, (blanching or redness of skin or burning or tingling sensation), do not rub, massage or compress the affected area. Send the casualty immediately to hospital.

#### Following eye contact

Remove any contact lenses.

Flush eyes with water thoroughly and continuously for at least 15 minutes.

Keep eye wide open while rinsing.

If there are signs of frostbite, pain, swelling, lacrimation or photophobia persists, the patient should be seen in a specialist health care facility.

#### Following ingestion

Is not considered a likely route of exposure.

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

Inhalation: Exposure to high concentrations may cause asphyxiation. Vapours may cause headache, fatigue, dizziness and nausea. In case of overexposure, organic solvents may depress the central nervous system causing dizziness and intoxication, and at very high concentrations unconsciousness and death.

**Skin Contact:** Contact with product in liquid form may cause frostbite. Prolonged or repeated contact with skin may cause redness, itching, irritation and eczema/chapping.

**Eye Contact:** Contact with product in liquid form may cause frostbite. Irritation of eyes and mucous membranes.

**Ingestion:** Frostbite to the lips and mouth may occur if in contact with the liquid.

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

##### **Advice to physician**

A simple asphyxiant gas at normal temperatures and pressures – there is no specific antidote. Oxygen-displacing gas. In the event of contact with product in liquid form treat for frostbite. Cardio-vascular monitoring. Symptomatic treatment.

### **SECTION 5: FIREFIGHTING MEASURES**

#### **5.1. Extinguishing media**

##### **Suitable extinguishing media**

**Large fire:** Use water spray, water fog or foam.

**Small fire:** Dry powder or carbon dioxide (CO<sub>2</sub>) extinguisher, dry sand or firefighting foam.

##### **Unsuitable extinguishing media**

Do NOT use water jet.

Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

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

Vapour is denser than air – flashback may be possible over considerable distances.

Cylinders or other containment vessels may explode under fire conditions - use water spray to cool unopened containers.

Do not allow run-off from firefighting to enter drains or water courses – may cause explosion hazard in drains and may reignite.

##### **Combustion products**

Carbon monoxide, carbon dioxide and unburned hydrocarbons (smoke), sulphur oxides.

#### **5.3. Advice for firefighters**

##### **Fire Fighting Measures**

Where possible stop the flow of gas and if safe to do so.

Avoid inhalation of material or combustion by-products.

If the flow cannot be stopped allow the fire to burn out, whilst cooling containers and surroundings with a water spray.

Keep unnecessary people away, isolate hazard area and deny entry. Evacuate if fire gets out of control or containers are directly exposed to fire. Stay upwind and keep out of low areas.

Control run-off water by containing and keeping it out of sewers and watercourses. If risk of water pollution occurs, notify appropriate authorities.

##### **Special protective equipment for fire-fighters**

Wear an approved positive pressure self-contained breathing apparatus with a full face-piece operated in positive pressure mode in addition to standard firefighting gear. Firefighter's clothing conforming to European standard EN469 (including helmets, protective boots and gloves) will provide a basic level of protection for chemical incidents.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### General information

Spillages of material generate large volumes of extremely flammable gas which is heavier than air and will accumulate in low areas or confined spaces.

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

#### Personal precautions

Wear personal protective equipment, including self-contained breathing apparatus, unless the atmosphere is proved to be safe. See Section 8.

#### Emergency procedures

Stop leak if safe to do so. Avoid direct contact with released material and breathing vapours. Stay upwind.

Keep non-involved personnel away from the area of spillage. Alert emergency personnel.

Enter area only if strictly necessary. A combustible gas detector can be used to check for flammable gas or vapours.

Eliminate all ignition sources if safe to do so (e.g. electricity, sparks, fires, flares, etc.). No smoking. If required, notify relevant authorities according to applicable regulations.

#### Further accidental release measures

Spillages of liquid product will create a fire hazard and form an explosive atmosphere.

Ensure all equipment is non-sparking or electrically bonded.

Ensure adequate ventilation. Ensure good room ventilation at floor level too.

### 6.2. Environmental precautions

Do not allow entrance in sewage water, drainage systems, stretches of water, soil. Avoid penetration into drainage system or in rooms situated at a lower level because of danger of explosion. Issue an immediate alarm report to the company environmental protection department if the product unintentionally leaves the production area.

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

#### Land spillage

Prevent further leakage or spillage if safe to do so.

Prevent spillage from entering drains or any place where accumulation may occur.

Ensure adequate ventilation, especially in confined areas.

#### Spillages in water or at sea

Prevent further leakage or spillage if safe to do so.

Spillages of liquid product in the water will likely result in a quick and complete vaporization of the product. Isolate the area and prevent fire/explosion hazard for ships and other structures, taking into account wind direction and speed, until the material is completely dispersed.

If the spillage contaminates rivers, lakes or drains inform respective authorities.

#### Methods for cleaning up: taking special safety precautions

Contain spillage – ventilate area and allow evaporating.

Clean contaminated area with oil-removing material.

#### **6.4. Reference to other sections**

For more information on personal protection/exposure controls or disposal considerations, please check Section 8 and 13 of this safety data sheet.

### **SECTION 7: HANDLING AND STORAGE**

Obtain special instructions before use.

Risk of explosive mixtures of vapour and air.

#### **7.1. Precautions for safe handling**

Consider technical advances and process upgrades (including automation) for the elimination of releases.

Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation.

Drain down systems and clear transfer lines prior to breaking containment.

Clean/flush equipment, where possible, prior to maintenance.

Consider the need for risk based health surveillance.

Ensure safe systems of work or equivalent arrangements are in place to manage risks.

Regularly inspect, test and maintain all control measures.

Smoking, eating and drinking should be prohibited.

Use only in well ventilated areas.

Avoid all sources of ignition, oxidising agents, chlorine and hydrogen chloride or hydrogen fluoride.

Take precautionary measures against static discharges, use proper bonding and/or grounding procedures.

Use piping and equipment designed to withstand the pressures to be encountered.

Use a check valve or other protective device to prevent reverse flow.

Cleaning, inspection and maintenance of the internal structure of storage tanks must be done only by properly equipped and qualified personnel as defined by national, local or company regulations.

Handle empty containers with care; vapour residue may be flammable.

Do not pressurise, cut, weld, braze, solder, drill, or grind on containers.

Dispose of rinse water in accordance with local and national regulations.

The vapour is heavier than air, beware of accumulation in pits and confined spaces.

Ensure that all relevant regulations regarding explosive atmospheres, and handling and storage facilities of flammable products are followed.

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

To store only in supplied cylinders or approved vessels.

No smoking.

Store in a designated cool and well-ventilated place.

Cylinders should be secured vertical - and only transported in a secure position in a well ventilated vehicle or hand truck.

Cylinders which have been opened must be carefully resealed and kept upright.

For maintenance work or conservation, emptied tanks should be purged, and blanketed with inert gas (i.e. nitrogen).

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

None.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**8.1. Control parameters**  
**8.1.1. Occupational Exposure Limits**

Country	LTEL 8 hr TWA ppm	LTEL 8 hr TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Note
<b>HYDROGEN SULPHIDE (CAS 7783-06-4)</b>					
European Union	5	7	10	14	
Austria	5	7	5	7	
Germany (AGS)	5	7.1	10	14.2	
Germany (DFG)	5	7.1	10	14.2	
Finland	5	7	10	14	
Latvia		10			
Poland		7		14	
Switzerland	5	7.1	10	14.2	
United Kingdom	5	7	10	14	
<b>PROPANE (CAS 74-98-6)</b>					
Austria	1000	1800	2000	3600	
Germany (AGS)	1000	1800	4000	7200	
Germany (DFG)	1000	1800	4000	7200	
Finland	800	1500	1100	2000	
Poland		1800			
Switzerland	1000	1800	4000	7200	
<b>BUTANE (CAS 106-97-8)</b>					
Austria	800	1600	1600	3800	
Germany (AGS)	1000	2400	4000	9600	
Germany (DFG)	1000	2400	4000	9600	
Finland	800	1900	1000	2400	
Latvia		300			
Poland		1900		3000	
Switzerland	800	1900			
United Kingdom	600	1450	750	1810	

GESTIS International Limit values: <http://limitvalue.ifa.dguv.de>



### 8.1.2. DNEL/ PNEC values DN(M)ELs for workers

Exposure pattern	Route	DNEL / DMEL	Most sensitive endpoint	Justification
Acute – systemic effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans.
Acute – local effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans.
Long-term – systemic effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans
Long-term – local effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans

### DN(M)ELs for the general population

Exposure pattern	Route	DNEL / DMEL	Most sensitive endpoint	Justification
Acute – systemic effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans
	Oral	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
Acute – local effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans
Long-term – systemic effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans
	Oral	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
Long-term – local effects	Dermal	NA	NA	In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature.
	Inhalation	NA (No-threshold effect and/or no dose response information available)	NA	A DNEL cannot be derived for this endpoint as no LOAEL or NOAEL can be determined due to absence of adverse effects relevant to humans

PNEC	Assessment factor	Remarks/Justification
<b>water</b>		
PNEC aqua (freshwater): Not applicable	Not applicable	Mixture is a gas and is extremely unlikely to reside in the aquatic compartment. Deriving an aquatic PNEC for a gas is unreasonable and technically of little use for risk assessment as the substance will not be present in the aquatic environment
PNEC aqua (marine water): Not applicable	Not applicable	
PNEC aqua (intermittent releases): Not applicable	Not applicable	
<b>sediments</b>		
PNEC sediment (freshwater): Not applicable	Not applicable	Mixture is a gas and is extremely unlikely to reside in the sediment compartment. Deriving a sediment PNEC for a gas is unreasonable and technically of little use for risk assessment as the substance will not be present in the sediment environment.
PNEC sediment (marine water): Not applicable	Not applicable	
<b>soil</b>		
PNEC soil: Not applicable	Not applicable	Mixture is a gas and is extremely unlikely to reside in the soil compartment. Deriving an soil PNEC for a gas is unreasonable and technically of little use for risk assessment as the substance will not be present in the soil environment
<b>sewage treatment plant</b>		
PNEC STP: Not applicable	Not applicable	The Petroleum gases are extremely unlikely to reside in the aquatic compartment. Deriving an aquatic PNEC for a gas is unreasonable and technically of little use for risk assessment as the substance will not be present in the aquatic environment
<b>oral (secondary poisoning)</b>		
PNEC oral: Not applicable	Not applicable	In accordance with column 2 of REACH Annex IX, the bioaccumulation in aquatic species study does not need to be conducted. The substance has a low potential for bioaccumulation as this Category stream has a log octanol water partition coefficient less than 3. This Category does not represent a risk of secondary poisoning. Therefore this PNEC does not need to be derived.

## 8.2. Exposure controls

### 8.2.1. Technical safety measures

Use closed-system units. If contact with gases or vapours cannot be excluded: Provide adequate ventilation or extraction. Observe Occupational Exposure Limits and minimise the risk of inhalation of vapours.

### Hygiene measures

Do not inhale vapours / aerosols. Avoid contact with skin and eyes. Remove contaminated or saturated clothing. Smoking, eating and drinking should be prohibited in the application area. Observe the rules usually applicable when handling chemicals.

### Thermal hazards

Contact with liquid form may cause frostbite.

## 8.2.2. Personal protection equipment

### Protective measures

Wear suitable protective clothing. Full protective suit, if necessary.

**Eye/face protection:** close-fitting protective goggles (e.g. closed goggles) or face protection.

**Skin protection (hand and body):** Glove material suitable protective gloves, e.g. nitrile-butadiene rubber (NBR) gloves, leather gloves, heat insulating. Selection of protective gloves to meet the requirements of specific workplaces. Suitability for specific workplaces should be clarified with protective glove manufacturers. The information is based on our own tests, references from the literature and information from glove manufacturers, or derived by analogy with similar materials. Remember that the useful time per day of a chemical protection glove may be much shorter than the permeation time determined according to EN 374 due to the many different influential factors involved (e.g. temperature).

Select materials and equipment for skin and body protection depending on the concentration and volume of hazardous substances and the workplace involved.

**Respiratory Protection:** In case of vapours/aerosols being formed or if the limit values like TLV are exceeded: If concentrations in the breathed air are low: Respirator with brown AX-type filter. Put on Respiratory protective equipment independent of surrounding air with high gas/vapour concentrations.

## 8.2.3. Environmental Exposure Controls

See Section 6.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

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

Property	Value	Method	Remark
Physical state at 20 °C and 1013 hPa	Liquefied gas		The substances in the Petroleum gases are gases at standard pressure and temperature
Colour	Colourless		
Odour	Odourless		
Odour threshold	Not available		
pH	Not applicable		
Melting point (°C) / Freezing point (°C)	-187.6 to -138.3		CSR_1(2010) CSR_2(2010)
Boiling point (°C) at 1013 hPa	-161.48 to -0.5		CSR_1(2010) CSR_2(2010)
Flash point (°C) at 1013 hPa	-104 to -60.0		Data for the Petroleum gases CSR_1(2010) CSR_2(2010)

Property	Value	Method	Remark
Flammability	Extremely flammable		CSR_1(2010) CSR_2(2010)
Upper/lower flammability or explosive limits	Lower flammable/explosive limit: 5 % Upper flammable/explosive limit: 15 %		REACH dossier information. Estimated value.
Vapour pressure (hPa) at 25°C	Not applicable		Study technically not feasible.
Relative density (g/cm <sup>3</sup> at 25 °C)	0.4228 - 0.589		Data for the Petroleum gases.
Water solubility (mg/L) at 25°C	24.4 - 61.2		CSR_1(2010) CSR_2(2010)
Stability in organic solvents and identity of relevant degradation products	Not available.		In accordance with column 1 of REACH Annex IX the stability in organic solvents study does not need to be conducted as the stability of the Petroleum gases is not considered to be critical.
Partition coefficient n-octanol/water (log value) at ambient temperature (20-25 °C)	1.09 - 2.8	QSAR KOWW IN	CSR_1(2010) CSR_2(2010)
Dissociation constant	Not available.		In accordance with section 1 of REACH Annex XI, the dissociation constant study does not need to be conducted as the members of the category do not contain any functional groups that dissociate and therefore testing does not appear scientifically necessary.
Self-ignition temperature (°C) at 1013 hPa	287 to 537		Data for the Petroleum gases CSR_1(2010) CSR_2(2010)
Decomposition temperature	Not available.		
Viscosity	Not available.		At normal ambient temperature and pressure these substances exist in the form of a gas. Hence, liquid viscosity values are not considered relevant.
Surface tension	Not applicable.		In accordance with Column 2 of REACH Annex VII, this study need only be conducted if surface activity is a desired property of the material.
Explosive properties	Vapours may form explosive mixtures with air.		

Property	Value	Method	Remark
Oxidising properties	There are no chemical groups present in the product that are associated with oxidising properties.		In accordance with column 2 of REACH Annex VII, this study does not need to be conducted as the members of the Petroleum gases are incapable of reacting exothermically with combustible materials, based on their chemical structures.
Granulometry	Not applicable.		In accordance with column 2 of REACH Annex VII the granulometry study does not need to be conducted as the Petroleum gases are not marketed or used in a non-solid or granular form.

## 9.2. Other information

None.

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. Reactivity

No specific reactivity hazards associated with this product under normal conditions of storage and use.

### 10.2. Chemical stability

Liquefied gas. Extremely flammable. The product is stable at room temperature in closed containers under normal storage and handling conditions.

### 10.3. Possibility of hazardous reactions

Vapours may form explosive mixture with air. Under normal conditions of storage and use, hazardous polymerization will not occur.

### 10.4. Conditions to avoid

Keep away from heat (>50 °C) and sources of ignition. Avoid proximity or contact with hot surfaces, flames, electrostatic charges or sparks. Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Avoid contact with incompatible materials.

### 10.5. Incompatible materials

Strong oxidising agents, chlorine, oxygen, acids, bases

### 10.6. Hazardous decomposition products

In case of fire or thermal decomposition: production of, for example, carbon monoxide, carbon dioxide (CO<sub>2</sub>). Partial combustion forms also: fume, soot and cracked products: aldehydes, ketones.

**SECTION 11: TOXICOLOGICAL INFORMATION**

Property	Results
<b>Acute toxicity</b>	
Oral	Study technically not feasible.*
Inhalation	<u>Propane</u> : LC50 (15 min): 1443 mg/L air (rats, male/female). <i>Based on key study data.</i> <u>Isobutane</u> : LC50 (120 min): 1237 mg/L air (mouse, male). <i>Based on key study data.</i> <u>Butane</u> : LC50: 658 mg/L (rats); LC50: 680 mg/L (mice)
Dermal	Study technically not feasible.*
<b>Skin corrosion/irritation</b>	Study technically not feasible.* Propane and butane are nonirritating to the skin. Direct skin or mucous membrane contact with liquefied material can cause burns and frostbite due to the extreme cold of the liquid.
<b>Serious eye damage/irritation</b>	Study technically not feasible.* Contact with liquid form may cause frostbite.
<b>Skin sensitisation</b>	Study technically not feasible.*
<b>Respiratory sensitisation</b>	Not available.
<b>Germ cell mutagenicity</b>	
In vitro data	Based on available data, the classification criteria are not met [OECD Guideline 471]
In vivo data	Based on available data, the classification criteria are not met
<b>Carcinogenicity</b>	In accordance with section 1 of REACH Annex XI, testing does not appear to be scientifically necessary since negative genotoxicity data and consideration of their simple chemical structures provide sufficient weight of evidence to conclude the Petroleum gases are unlikely to show any significant carcinogenic activity.
Oral	
Inhalation	
Dermal	
<b>Reproductive toxicity</b>	Based on available data, the classification criteria are not met [OECD Guideline 422, OPPTS 870.3650]
<b>STOT - single exposure</b>	Not available
<b>STOT - repeated exposure</b>	<u>Propane (rats) [OECD Guideline 422, OPPTS 870.3650]</u> : NOAEC (overall systemic toxicity): 4000 ppm (male/female) NOAEC (overall systemic toxicity): 7214 mg/m <sup>3</sup> air (male/female) LOAEC: 12000 ppm (male/female) LOAEC: 21641 mg/m <sup>3</sup> air (male/female) <u>Butane (rats) [OECD Guideline 422, OPPTS 870.3650]</u> : NOAEC (systemic toxicity): 9000 ppm (male/female) NOAEC (systemic toxicity): 21394 mg/m <sup>3</sup> air (male/female) <u>Isobutane (rats) [OECD Guideline 422, OPPTS 870.3650]</u> : NOAEC (systemic toxicity): 9000 ppm (male/female) NOAEC (systemic toxicity): 21394 mg/m <sup>3</sup> air (male/female)
<b>Aspiration hazard</b>	Not relevant for gases.
<b>Other effects</b>	No.

\* In accordance with section 2 of REACH Annex XI, the study does not need to be conducted as Petroleum Gases are flammable gases at room temperature and capable of forming explosive mixtures with air. A high fire and explosion hazard would be associated with any testing at meaningful concentrations.

**SECTION 12: ECOLOGICAL INFORMATION**

Property	Value	Remarks
<b>TOXICITY</b>		
<b>Fish</b>		
Short-term toxicity	LC50 (96 h): 49.47 mg/L	QSAR data (propane)
	LC50 (96 h): 24.11 mg/L	QSAR data (butane)
	LC50 (96 h): 27.98 mg/L	QSAR data (isobutane)
Long-term toxicity	LC50 (48 h): 27.14 mg/L	QSAR data (propane)
	LC50 (96 h): 27.98 mg/L	QSAR data (isobutane)
<b>Aquatic invertebrates</b>		
Short-term toxicity	LC50 (48 h): 27.14 mg/L	QSAR data (propane)
	LC50 (48 h): 14.22 mg/L	QSAR data (butane)
	LC50 (48 h): 16.33 mg/L	QSAR data (isobutane)
Long-term toxicity	-	In accordance with column 2 of REACH Annex IX, the study does not need to be conducted as the chemical safety assessment according to Annex I has not indicated a need to investigate further the effects on aquatic organisms.
Algae and aquatic plants	EC50 (96 h): 11.89 mg/L	QSAR data (propane)
	EC50 (96 h): 7.71 mg/L	QSAR data (butane)
	EC50 (96 h): 8.57 mg/L	QSAR data (isobutane)
<b>Sediment organisms</b>	-	In accordance with column 2 of REACH Annex X, the study does not need to be conducted as the chemical safety assessment according to Annex I has not indicated a need to investigate further the effects of the substance and/or degradation products on sediment organisms.
<b>Toxicity to soil macro-organisms</b>	-	In accordance with column 2 of REACH Annex X, the study does not need to be conducted as direct and indirect exposure of the soil compartment is unlikely.
<b>Toxicity to soil micro-organisms</b>	-	
<b>Toxicity to terrestrial plants</b>	-	
<b>Toxicity to birds</b>		The long term or reproductive toxicity to birds study does not need to be conducted as there is no indication that this substance has the potential to contaminate food chains as it is not persistent or bioaccumulative.
<b>PERSISTENCE AND DEGRADABILITY</b>		
<b>Abiotic degradation</b>		
Hydrolysis	Not applicable.	Petroleum gases are not expected to undergo hydrolysis in the environment due to a lack of hydrolysable functional groups and therefore testing does not appear scientifically necessary.
Phototransformation/ photolysis in air	Not available.	
Phototransformation in water	Not available.	
Phototransformation in soil	Not available.	



Property	Value	Remarks
<b>Biodegradation</b>		
Biodegradation in water	Readily biodegradable 50% after 3 d; 50 after 3.46 d; 50 after 3.1 d	QSAR data (propane) QSAR data (butane) QSAR data (isobutane)
Biodegradation in soil	Study technically unjustified.	In accordance with Column 1 of REACH Annex IX, this study does not need to be conducted as the Petroleum gases have a low potential for adsorption to soil.
<b>BIOACCUMULATIVE POTENTIAL</b>		
Aquatic bioaccumulation		In accordance with column 2 of REACH Annex IX, this study need not be conducted as the Petroleum gases have a low potential for bioaccumulation (log Kow =<3).
<b>MOBILITY IN SOIL</b>		
Adsorption/desorption		The Petroleum gases can be expected to have a low potential for adsorption (log Kow <3).
Volatilization	Not available	
<b>RESULT OF PBT AND VPvB ASSESSMENT AND OTHER ADVERSE EFFECTS</b>		
<b>Result of PBT and vPvB assessment</b>	Not PBT or vPvB.	The Petroleum gases are not considered PBT as they do not meet the screening criteria for persistence, bioaccumulation and toxicity.
<b>Other adverse effects</b>	Not available.	

**SECTION 13: DISPOSAL CONSIDERATIONS**

**General information**

When handling waste, consideration should be made to the safety precautions applying to handling of the product. Do not puncture or incinerate even when empty.

**13.1. Waste treatment methods**

DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS EVEN WHEN EMPTY.

Make sure containers are empty before discarding (explosion risk). Dispose of waste and residues in accordance with local authority requirements.


**13.2. Additional Information**

Waste Class European Waste Catalogue (EWC):

No waste key number as per the European Waste Types List can be assigned to this product, since such classification is based on the (as yet undetermined) use to which the product is put by the consumer. The waste key number must be determined as per the European Waste Types List (decision on EU Waste Types List 2000/532/EC) in cooperation with the disposal firm / producing firm / official authority.

**SECTION 14: TRANSPORT INFORMATION**

**14.1. UN number**

Land transport (ADR/RID):	UN 1965* (HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (technical name))
Inland waterway transport (ADN):	
Air transport (IATA):	
Sea transport (IMDG):	
<b>Hazard label:</b>	

\* Propane: UN 1978; Butane: UN 1011.

**14.2. UN proper shipping name**

Land transport (ADR/RID):	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S (technical name)**
Inland waterway transport (ADN):	
Air transport (IATA):	
Sea transport (IMDG):	

\*\* The use of UN 1965 requires the proper shipping name to incorporate the technical name. According to section 3.1.2.8.1 of the UN Model Regulations (15th revised edition) the technical name shall be a recognized chemical or other name used in scientific and technical handbooks, journals and texts.

For land transport (ADR/RID) and inland waterway transport the technical name could be Mixture A, Mixture A01, Mixture A02, Mixture A1, Mixture B1, Mixture B2, Mixture B, Mixture C, propane, butane or the chemical name(s) of not more than two of the constituents which most predominantly contribute to the hazard(s).

For marine transport (IMDG), air transport (ICAO/IATA) the technical name could be propane, butane or the chemical name(s) of not more than two of the constituents which most predominantly contribute to the hazard(s).

**14.3. Transport hazard class(es)**

Land transport (ADR/RID):	2  Label: 2.1 Flammable gas.
Inland waterway transport (ADN):	
Air transport (IATA):	
Sea transport (IMDG):	

**14.4. Packaging group**

Land transport (ADR/RID):	Not applicable.
Inland waterway transport (ADN):	
Air transport (IATA):	
Sea transport (IMDG):	

**14.5. Environmental hazards**

Inland waterway transport (ADN):	No.
Land transport (ADR/RID):	
Air transport (IATA):	
Sea transport (IMDG):	

#### 14.6. Additional Information

Land transport (ADR/RID):	Classification code: 2F Special provisions: 274, 583, 652, 660, 662 Hazard identification number 23 Tunnel restriction code (ADR): B/D EAC code : 2YE For RID only - 13 Shunt with care. Packing instruction P200
Inland waterway transport (ADN):	Classification code: 2F Special provisions: 274, 583, 660
Air transport (IATA):	ERG Code: 10L Forbidden on aircraft carrying passengers and cargo. Permitted on aircraft carrying only cargo, packing instruction P200.
Sea transport (IMDG):	EmS number: F-D, S-U

#### Additional transport information

The transportation of dangerous goods (by land, water or air) is a specialized professional field. Dangerous goods transport is regulated by an extensive body of recommendations, regulations, rules and agreements to ensure an adequate and harmonised level of safety for man and environment. Whereas some of these requirements have been adopted as European Union legislation, others are legally binding international treaties or sector agreements. They cover all the relevant technical aspects involved in the transport of dangerous goods (e.g. choice of equipment, labelling, documentation, packaging design, testing procedures, operating procedures etc.).

In addition to legal obligations discussed in the previous paragraph, Member states will also have in place detailed binding regulations governing the general conduct of transport activities, including licensing and inspection of vehicles, the authorization of drivers and other personnel, and issues relating to the rules of the road. There may also be specific national exceptions and requirements.

#### 14.6. Special precautions for user

Always transport in closed containers. Ensure that persons transporting the product know what to do in the event of an accident or spillage. For information regarding Exposure Controls/Personal Protection see Section 8 of the SDS.

#### 14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

### SECTION 15: REGULATORY INFORMATION

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

*Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I and Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer:*

Annex II - Not listed.

*Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances- (SEVESO III):*

P2 Flammable Gases

*Directive 2013/39/EU priority substances in the field of water policy (amending Directive 2006/60/EC – Water Framework Directive and Directive 2008/105/EC on environmental quality standards in the field of water policy):*

Not listed

*Regulation (EC) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of dangerous chemicals:*

Not listed

*Regulation (EC) No 850/2004 on persistent organic pollutants (List of substances subject to release reduction provisions):*

Not listed

## 15.2. Chemical Safety Assessment

Chemical Safety Reports have been developed for Propane (CSR\_1, 2010) and Butane (CSR\_2, 2010).

Members of this category (Petroleum gases) are not classified for human health or the environment, are not a CMR and are not PBT or vPvB. An exposure assessment and the calculation of risk characterisation ratios are therefore not required.

## SECTION 16: OTHER INFORMATION

### 16.1. Indication of changes

VERSION	Date of change	Section	Description of changes
Version: 2.1	08/02/2011	All	Initial SDS.
Version: 3.0	19/03/2018	All	This Safety Data Sheet has been fully revised with changes in each section from 1 to 16 in accordance with requirements of Regulations (EC) 1907/2006 (REACH), (EC) 1272/2008 (CLP) & (EU) 2015/830 on the basis of registration data (Registration dossiers and CSR).

### 16.2. Abbreviations and acronyms

ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
AGS	The German Committee on Hazardous Substances (Ausschuss für Gefahrstoffe – AGS)
DFG	Germany Research Foundation
DN(M)EL	Derived No(Minimum) Effect Level
EC50	Half Maximal Effective Concentration
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
LD50	Lethal Dose to 50% of a test population (Median Lethal Dose)
LC50	Lethal Concentration to 50 % of a test population

LOAEC	Lowest Observable Adverse Effect Concentration
LOEC	Lowest Observed Effects Concentration
LTEL	Long Term Exposure Limit
NOAEC	No Observed Adverse Effect Concentration
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effects Concentration
PNEC	Predicted No Effect Concentration
PBT	Persistent, bioaccumulative, toxic chemical
RID	Regulations concerning the international railway transport of dangerous goods
vPvB	Very Persistent, Very Bioaccumulative
STEL	Short Term Exposure Limit
STOT	Specific Target Organ Toxicity

### 16.3. Hazard statements

H220	Flam. Gas 1	Extremely flammable gas.
H280	Liquefied gas	Contains gas under pressure; may explode if heated.
H330	Acute Tox. 2	Fatal if inhaled.
H335	STOT SE 3	May cause respiratory irritation.
H400	Aquatic Acute 1	Very toxic to aquatic life

### 16.4. Key literature references and sources

Documents, provided by LOA REACH Consortium: chemical safety reports for propane and butane (CAS# 74-98-6 and CAS #106-97-8).

### EU DIRECTIVES

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1272/2008 REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

COMMISSION REGULATION (EU) no 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

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**ANNEX 1. RELEVANT IDENTIFIED USES OF THE SUBSTANCE**

**Uses by workers in industrial settings**

<b>Identified Use (IU) name</b>	<b>Use descriptors</b>
Manufacture of substance	<p><b>Process category (PROC):</b>                      PROC 1: Use in closed process, no likelihood of exposure                      PROC 2: Use in closed, continuous process with occasional controlled exposure                      PROC 3: Use in closed batch process (synthesis or formulation)                      PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises                      PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities                      PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities                      PROC 15: Use as laboratory reagent</p> <p><b>Environmental release category (ERC):</b>                      ERC 1: Manufacture of substance                      ERC 6a: Industrial use resulting in manufacture of another substance (intermediate)</p> <p><b>Sector of end use (SU):</b>                      SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)                      SU 9: Manufacture of fine chemicals</p>
Distribution of substance	<p><b>Process category (PROC):</b>                      PROC 1: Use in closed process, no likelihood of exposure                      PROC 2: Use in closed, continuous process with occasional controlled exposure                      PROC 3: Use in closed batch process (synthesis or formulation)                      PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises                      PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities                      PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities                      PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)                      PROC 15: Use as laboratory reagent</p> <p><b>Environmental release category (ERC):</b>                      ERC 1: Manufacture of substances                      ERC 2: Formulation of preparations                      ERC 3: Formulation of materials                      ERC4: Industrial use of processing aids in processes and products, not becoming part of articles                      ERC5: Industrial use resulting in inclusion into or onto a matrix                      ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates)                      ERC 6b: Industrial use of reactive processing aids                      ERC 6c: Industrial use of monomers for manufacture of thermoplastics                      ERC 6d: Industrial use of process regulators for polymerisation processes in</p>

Identified Use (IU) name	Use descriptors
	<p>production of resins, rubbers, polymers            ERC 7: Industrial use of substances in closed systems  <b>Sector of end use (SU):</b>            SU 8: Manufacture of bulk, large scale chemicals (including petroleum products)            SU 9: Manufacture of fine chemicals</p>
Use as a fuel	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected  <b>Environmental release category (ERC):</b>            ERC 7: Industrial use of substances in closed systems  <b>Sector of end use (SU):</b>            SU 0: Other: 3</p>
Blowing agents	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)            PROC 12: Use of blowing agents in manufacture of foam  <b>Environmental release category (ERC):</b>            ERC4: Industrial use of processing aids in processes and products, not becoming part of articles  <b>Sector of end use (SU):</b>            SU 0: Other: 3</p>
Formulation and (re)packaging of substances and mixtures	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p>

Identified Use (IU) name	Use descriptors
	<p>PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)            PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation            PROC 15: Use as laboratory reagent</p> <p><b>Environmental release category (ERC):</b>            ERC 2: Formulation of preparations</p> <p><b>Sector of end use (SU):</b>            SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Polymer production	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected</p> <p><b>Environmental release category (ERC):</b>            ERC4: Industrial use of processing aids in processes and products, not becoming part of articles            ERC 6c: Industrial use of monomers for manufacture of thermoplastics</p> <p><b>Sector of end use (SU):</b>            SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Polymer processing	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)            PROC 6: Calendering operations            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>



Identified Use (IU) name	Use descriptors
	<p>PROC 13: Treatment of articles by dipping and pouring            PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p><b>Environmental release category (ERC):</b>            ERC4: Industrial use of processing aids in processes and products, not becoming part of Articles</p> <p><b>Sector of end use (SU):</b>            SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Functional fluids	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p><b>Environmental release category (ERC):</b>            ERC 7: Industrial use of substances in closed systems</p> <p><b>Sector of end use (SU):</b>            SU 0: Other: 3</p>
<b>Uses by professional workers</b>	
Use as a fuel	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 16: Using material as fuel sources, limited exposure to unburned product to be expected</p> <p><b>Environmental release category (ERC):</b>            ERC 9a: Wide dispersive indoor use of substances in closed systems            ERC 9b: Wide dispersive outdoor use of substances in closed systems</p> <p><b>Sector of end use (SU):</b> Other: 22</p>

Identified Use (IU) name	Use descriptors
Propellants	<p><b>Process category (PROC):</b>            PROC 11: Non industrial spraying</p> <p><b>Environmental release category (ERC):</b>            ERC 8a: Wide dispersive indoor use of processing aids in open systems            ERC 8d: Wide dispersive outdoor use of processing aids in open systems</p> <p><b>Sector of end use (SU): Other: 22</b></p>
Polymer processing	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 4: Use in batch and other process (synthesis) where opportunity for exposure arises            PROC 5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)            PROC 6: Calendering operations            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities            PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation            PROC 21: Low energy manipulation of substances bound in materials and/or articles</p> <p><b>Environmental release category (ERC):</b>            ERC 8a: Wide dispersive indoor use of processing aids in open systems</p> <p><b>Use (SU): Other: 22</b></p>
Functional fluids	<p><b>Process category (PROC):</b>            PROC 1: Use in closed process, no likelihood of exposure            PROC 2: Use in closed, continuous process with occasional controlled exposure            PROC 3: Use in closed batch process (synthesis or formulation)            PROC 8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities            PROC 9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)            PROC 20: Heat and pressure transfer fluids in dispersive, professional use but closed systems</p> <p><b>Environmental release category (ERC):</b>            ERC 9a: Wide dispersive indoor use of substances in closed systems            ERC 9b: Wide dispersive outdoor use of substances in closed systems</p> <p><b>Sector of end use (SU): Other: 22</b></p>
<b>Uses by consumers</b>	
Identified Use (IU) name	Use descriptors
Use a fuel	<p><b>Chemical product category (PC):</b>            PC 13: Fuels</p>

Identified Use (IU) name	Use descriptors
	<p><b>Environmental release category (ERC):</b>            ERC 9a: Wide dispersive indoor use of substances in closed systems            ERC 9b: Wide dispersive outdoor use of substances in closed systems</p> <p><b>Subsequent service life relevant for that use?: No</b></p>
Propellants	<p><b>Chemical product category (PC):</b>            PC 1: Adhesives, sealants            PC 2: Adsorbents            PC 3: Air care products            PC 4: Anti-freeze and de-icing products            PC 0: Other: 5, 10            PC 31: Polishes and wax blends            PC 35: Washing and cleaning products (including solvent based products)            PC 39: Cosmetic personal care products</p> <p><b>Environmental release category (ERC):</b>            ERC 8a: Wide dispersive indoor use of processing aids in open systems</p>

END OF SAFETY DATA SHEET