

VERSION: 2.1
Created: 08/02/2011

MATERIAL SAFETY DATA SHEET
According to 1907/2006/EC (REACH), 1272/2008 (CLP) & 453/2010

ISOBUTANE

Version: 2.1
Created: 08/02/2011
Date Updated: -
Regulation: EC No 1272/2008

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

1.1 Product identifier

Name of Substance: Isobutane
Synonyms: 2-methylpropane
Index No (CLP) 601-004-00-0
CAS #: 75-28-5
EC #: 200-857-2
Registration #: 01-2119485395-27-0008

1.2 Relevant identified uses of the substance

See Annex 1

Most common technical function of substance:

Intermediates

Fuels and fuel additives

Uses advised against

The use of the substance should be limited to those specified in Annex 1.

1.3 Details of the supplier of the safety data sheet

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VERSION: 2.1
Created: 08/02/2011

Emergency phone in the country of delivery: **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

ANNEX I OF DIRECTIVE 67/548/EEC:

Physical/Chemical Hazards:

F+; R12 Extremely flammable;

Health Hazards:

Not classified

Environmental hazards:

Not classified

EU CLP 2008:

Physical / Chemical Hazards:

H220 Extremely flammable gas

H280 Liquefied gas; contains gas under pressure; may explode if heated

Health Hazards:

Not classified

Environmental hazards:

Not classified

2.2 LABELLING

EU LABELLING

Indication of danger: Extremely Flammable



Symbol: F+

CLP LABELLING

Signal word: Danger

Hazard pictogram:



GHS02: flame



GHS04: gas cylinder

The Full Text for all S, P-Phrases is displayed in Section 15.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Component	Conc %	CAS / EC #	Classification 67/548/EEC and EU CLP 2008
Isobutane	98.0-99.8	75-28-5/200-857-2	F+; R12 H224, H280

Specific Conc. Limits (CLP): none

The product does not contain impurities or additives that could affect product's labelling and classification according to 67/548/EEC and EU CLP 2008.

SECTION 4. 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 ADVICE:

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.

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

INHALATION:

Symptom(s): Exposure to high concentrations may cause asphyxiation.

Move 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.

SKIN CONTACT:

Symptom(s): Contact with product in liquid form may cause frostbite.

Do not remove clothing that adheres due to freezing.

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

VERSION: 2.1
Created: 08/02/2011

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

EYE CONTACT:

Symptom(s): Contact with product in liquid form may cause frostbite.

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, lachrimation or photophobia persists, the patient should be seen in a specialist health care facility.

INGESTION:

Is not considered a likely route of exposure – frostbite to the lips and mouth may occur if in contact with the liquid.

ADVICE TO PHYSICIAN:

A simple asphyxiant gas at normal temperatures and pressures – there is no specific antidote.

In the event of contact with product in liquid form treat for frostbite.

SECTION 5. FIRE-FIGHTING MEASURES

Where possible stop the flow of gas.

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

SUITABLE EXTINGUISHING MEDIA:

LARGE FIRE: Use water spray, water fog or foam.

SMALL FIRE: Dry powder or carbon dioxide (CO₂) extinguisher, dry sand or fire fighting 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.

COMBUSTION PRODUCTS:

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

SPECIFIC HAZARDS DURING FIRE FIGHTING:

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 fire fighting to enter drains or water courses – may cause explosion hazard in drains and may reignite.

FURTHER INFORMATION:

Special protective equipment for fire-fighters:

Wear an approved positive pressure self-contained breathing apparatus in addition to standard fire fighting gear.

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.

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.).

If required, notify relevant authorities according to applicable regulations.

PERSONAL PRECAUTIONS:

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

ENVIRONMENTAL PRECAUTIONS:

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 CLEAN UP:

Contain spillage – ventilate area and allow to evaporate.

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.

Dispose of wastes safely.

SECTION 7. HANDLING AND STORAGE

Obtain special instructions before use.

Risk of explosive mixtures of vapour and air.

ADVICE ON SAFE HANDLING:

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

VERSION: 2.1
Created: 08/02/2011

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.

STORAGE:

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).

ADDITIONAL INDICATIONS:

For Substance registered as isolated intermediate under SCC:

This substance is handled under Strictly Controlled Conditions in accordance with REACH regulation Article 17(3) for on-site isolated intermediates and, in case the substance is transported to other sites for further processing, the substance should be handled at these sites under the Strictly Controlled Conditions as specified in REACH regulation Article 18(4). Site documentation to support safe handling arrangements including the selection of engineering, administrative and personal protective equipment controls in accordance with risk-based management systems is available at each manufacturing site.

SECTION 8. EXPOSURE CONTROL/PERSONAL PROTECTION

EXPOSURE LIMITS

A DN(M)EL for acute toxicity should be derived if an acute hazard leading to acute toxicity (eg. C&L) has been identified and there is a potential for high peak exposures. This is not the case for Isobutane. Dermal and oral studies are not technically feasible as this gas at room temperature shows very low toxicity via the inhalation route.

There was an absence of adverse effects relevant to humans in the repeat dose toxicity studies.

No chronic toxicity data is available. Together with the conclusion that Isobutane is not genotoxic, a strong case for concluding that it will not show any significant carcinogenic activity.

ACUTE TOXICITY DERMAL

Testing technically not feasible.

Isobutane is not irritating. Direct mucous membrane contact with liquid forms of Isobutane may cause burns and frostbite due to the extreme cold of the liquid.

ACUTE TOXICITY ORAL

Testing not technically possible.

The weight of evidence from studies on Isobutane indicates no evidence of development toxicity.

ACUTE TOXICITY INHALATION

No-threshold effect and/or no dose-response information available

PROTECTIVE EQUIPMENT

Protective gloves, safety goggles and protective clothing.

RESPIRATORY EQUIPMENT

Wear positive pressure self-contained breathing apparatus.

HAND PROTECTION

Wear appropriate protective gloves to prevent skin exposure.

EYE PROTECTION

Wear approved safety goggles.

HYGIENE MEASURES

Wash at the end of each work shift and before eating, drinking, smoking or using the toilet.

SKIN PROTECTION

Wear protective clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Colourless gas
Odour:	Odourless
Odour threshold	Not available
pH:	Not available
Molecular weight	58.1222
Freezing point:	Not available
Melting point:	-160.0C
Boiling point / range:	-11.7°C
Autoignition temperature	460°C
Flash point	- 82°C
Flammability:	1,8 – 8,5 %
Explosive properties:	Not applicable
Oxidising properties:	Not applicable
Vapour pressure:	Not applicable
Relative density (at - 45.0 °C):	0.5853 g/cm ³
Solubility:	Not available
Water solubility:	non soluble
Log partition coefficient (n-octanol/water):
Vapour density:	Not available
Evaporation rate (n-butyl acetate = 1):	Not available
Other information: Hygroscopic: Coefficient of thermal expansion:	None

SECTION 10. STABILITY AND REACTIVITY

STABILITY

Liquefied gas. Extremely flammable. Stable at room temperature in closed containers under normal storage and handling conditions.

MATERIALS TO AVOID

Strong oxidizing agents.

CONDITIONS TO AVOID

Ignition sources, excess heat.

HAZARDOUS DECOMPOSITION PRODUCTS

(CO)x: carbon monoxide, carbon dioxide.

REACTION CAPACITY

Oxidizes, halogenates.

SECTION 11. TOXICOLOGICAL INFORMATION	
	CONCLUSION/REMARKS
SKIN IRRITATION OR CORROSION	
Assessment of available human and animal data,	Not relevant - gas at room temperature.
Assessment of the acid or alkaline reserve In vitro studies	Not relevant.
In vivo skin irritation	Not relevant - gas at room temperature. Direct skin contact with liquid forms of isobutane may cause burns and frostbite due to the extreme cold of the liquid.
EYE IRRITATION	
Assessment of available human and animal data	Not irritating.
Assessment of the acid or alkaline reserve in vitro study	Not relevant.
In vivo eye irritation	Not relevant - gas at room temperature. Direct mucous membrane contact with liquid forms of Isobutane may cause burns and frostbite due to the extreme cold of the liquid.
SKIN SENSITISATION	
Assessment of available human, animal and alternative data	There are no reports of sensitisation from the available literature.
In vivo study	Not relevant - gas at room temperature.
MUTAGENICITY	
In vitro studies In vivo studies	Mutagenicity data exist for Isobutane. A review of an extensive database indicates it is not genotoxic.
ACUTE TOXICITY	
By oral route By inhalation By dermal route	Oral: Not relevant - gas at room temperature. Inhalation: Low acute toxicity with LC50 (rat) values exceeding 961 mg/L (961,000 mg/m ³). Dermal: Not relevant - gas at room temperature.
REPEATED DOSE TOXICITY	
Short term and sub-chronic toxicity	Low sub-chronic toxicity by inhalation.
REPRODUCTIVE TOXICITY	
Fertility Pre-natal developmental tox study	No evidence of reproductive or developmental effects.
TOXICOKINETICS	
	Short chain isobutane which exist as a vapour at room temperature, are very poorly absorbed, and if absorbed, are normally rapidly exhaled

CHRONIC/OTHER EFFECTS	No specific carcinogenicity data are available on isobutane. However, its simple chemical structure with no reactive groups and no structural alerts for likely genotoxic carcinogenic activity, together with the conclusion that isobutane is not genotoxic, provide a strong case for concluding that isobutane will not show any significant carcinogenic activity.
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SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICITY:

There are no measured data available for the aquatic toxicity endpoints. QSAR data indicate that the fish acute toxicity LC50 ranges from 24.11 to 147.54 mg/l, aquatic invertebrate acute toxicity LC50 ranged from 7.02 to 69.43 mg/l and the algae acute toxicity EC50 ranged 7.71 to 16.5 mg/l.

AQUATIC TOXICITY:

Short term toxicity to invertebrates (Daphnia):	Not available
Long term toxicity testing on invertebrates (Daphnia):	Not available
Short term toxicity testing on fish:	Not available
Long term toxicity testing on fish:	Not available
Growth inhibition study aquatic plants:	Not available
Activated sludge respiration inhibition testing:	Not available
Long term toxicity to sediment organisms	Not available

TERRESTRIAL TOXICITY

Long term toxicity to invertebrates:	Not available
Effects on soil microorganism:	Not available
Long-term toxicity to plant:	Not available
Long-term or reproductive toxicity to birds:	Not available

MOBILITY:

Adsorption / desorption:	Not expected to adsorb to soil or sediment due to the low log Kow < 3.
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PERSISTENCE AND DEGRADABILITY:

Biotic	
Ready biodegradability:	Readily biodegradable
Simulation testing:	Not available
Abiotic:	
Hydrolysis as a function of pH:	Will not undergo hydrolysis
Identification of degradation products:	Not available
Photolysis:	Will not undergo photolysis
Atmospheric oxidation:	Expected to rapidly degrade by indirect photolysis in air

BIOACCUMULATIVE POTENTIAL:

Not expected to bioaccumulate due to the low log Kow < 3.

PBT/vPvB? Does not meet criteria.

Other adverse effects: none

SECTION 13. DISPOSAL CONSIDERATIONS

ECOTOXICITY

Insufficiently investigated.

WATER HAZARD CLASSIFICATION

According to the German VwVwS: WGK-0 (not listed)

GENERAL INFORMATION

Place into a suitable closed container for disposal.

DISPOSAL METHODS

Dispose of in accordance with local and national regulations. DO NOT CUT, DRILL, GRIND, WELD OR PERFORM SIMILAR OPERATIONS ON OR NEAR CONTAINERS EVEN WHEN EMPTY.

SECTION 14. TRANSPORT INFORMATION

GENERAL

The product is covered by international regulations on the transport of dangerous goods under UN DOT, hazard class 2.1 (compressed gas).

	UN	ADR	RID	IMDG	ICAO
UN number	1969	1969	1969	1969	1969
Class	2.1	2	2	2.1	2.1
Packing group	-				
Transport category	2	2			
Hazard label	2.1	2.1			

CHRIS compatibility group: 31, paraffins

USCG regulated: yes

USCG flammable/combustible cargo: yes

USCG flammability/combustibility grade: LFG

IMO:

IGC code applicable

GC code applicable

SECTION 15. REGULATORY INFORMATION

UK REGULATORY REFERENCES

Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations 1988. Health and Safety at Work Act 1974.

ENVIRONMENTAL LISTING

Control of Pollution Act 1974.

EU DIRECTIVES

VERSION: 2.1
Created: 08/02/2011

System of specific information relating to Dangerous Preparations. 2001/58/EC. Dangerous Preparations Directive 1999/45/EC.

Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances.

Regulations. Commission regulation (EU) no 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

STATUTORY INSTRUMENTS

Notification of New Substances Regulations (NONS) 1993. The Export and Import of Dangerous Chemicals Regulations 2005 number 928.

APPROVED CODE OF PRACTICE

Classification and Labelling of Substances and Preparations Dangerous for Supply (EU 2001/59/EC). Safety Data Sheets for Substances and Preparations (REACH).

GUIDANCE NOTES

Workplace Exposure Limits EH40. Introduction to Local Exhaust Ventilation HS(G)37. CHIP for everyone HSG(108).

NATIONAL REGULATIONS

The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002. No. 1689. Workplace Exposure Limits 2005 (EH40).

The Carriage of Dangerous Goods and use of transportable pressure equipment regulations 2004.

Control of Substances hazardous to health regulations 2002 (as amended).

NATIONAL REGULATIONS (GERMANY)

Major Accident Hazard Legislation 82/501/EWG.

CHEMICAL SAFETY REPORT HAS BEEN PERFORMED FOR ISOBUTANE Exposure scenarios was not performed in the CSR

Safety Advice:

S2 – Keep out of the reach of children

S9 - Keep container in a well-ventilated place

S16 - Keep away from sources of ignition - No smoking

S33 – Take precautionary measures against static discharges

Additional precautionary statements:

P102 Keep out of reach of children

P210 Keep away from heat/sparks/open flames/.../hot surfaces. ... No smoking

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

P381 Eliminate all ignition sources if safe to do so

P243 Take precautionary measures against static discharge.

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

SECTION 16. OTHER INFORMATION

VERSION: 2.1
Created: 08/02/2011

ISSUED BY HS&E Manager
VERSION: 2.1
DATE CREATED: 08/02/2011
DATE UPDATED: -

DISCLAIMER

This information is based on our current level of knowledge. This information may be subject to revision as new knowledge and experience becomes available, and SIBUR makes no warranties and assumes no liability in connection with any use of this information. Since SIBUR cannot be aware of all aspects of your business and the impact the REACH Regulation has for your company, SIBUR strongly encourages you to get familiar with the REACH Regulation in order to comply with its requirements and timelines.

Annex 1

Relevant identified uses of the substance

Uses by workers in industrial settings

Identified Use (IU) name	Use descriptors
Manufacture of substance	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 1: Manufacture of substance ERC 6a: Industrial use resulting in manufacture of another substance (intermediate)</p> <p>Sector of end use (SU): SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals</p> <p>Subsequent service life relevant for that use?: yes</p>
Distribution of substance	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 6a: Industrial use resulting in manufacture of another substance (use of intermediates)</p> <p>Sector of end use (SU):</p>

Identified Use (IU) name	Use descriptors
	<p>SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals</p>
Use as a fuel	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 7: Industrial use of substances in closed systems</p> <p>Sector of end use (SU): SU 0: Other: 3</p>
Blowing agents	<p>Process category (PROC): 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</p> <p>Environmental release category (ERC): ERC 8a: Wide dispersive indoor use of processing aids in open systems</p> <p>Sector of end use (SU): SU 0: Other: 3</p>
Formulation and (re)packaging of substances and mixtures	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 2: Formulation of preparations</p> <p>Sector of end use (SU): SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Polymer production	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Sector of end use (SU): SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Polymer processing	<p>Process category (PROC): 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</p>

Identified Use (IU) name	Use descriptors
	<p>(dedicated filling line, including weighing) PROC 13: Treatment of articles by dipping and pouring PROC 14: Production of preparations or articles by tableting, compression, extrusion, pelletisation</p> <p>Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Sector of end use (SU): SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)</p>
Functional fluids	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 7: Industrial use of substances in closed systems</p> <p>Sector of end use (SU): SU 0: Other: 3</p>
Manufacture of substance	<p>Process category (PROC): 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>Sector of end use (SU): SU 8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 9: Manufacture of fine chemicals</p>
Uses by professional workers	

Identified Use (IU) name	Use descriptors
Use as a fuel	<p>Process category (PROC): 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>Environmental release category (ERC): ERC 9a: Wide dispersive indoor use of substances in closed systems ERC 9b: Wide dispersive outdoor use of substances in closed systems Sector of end use (SU): Other: 22</p>
Propellants	<p>Process category (PROC): PROC 11: Non industrial spraying</p> <p>Environmental release category (ERC): ERC 8a: Wide dispersive indoor use of processing aids in open systems</p> <p>Sector of end use (SU): Other: 22</p>
Polymer processing	<p>Process category (PROC): 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>Sector of end Environmental release category (ERC): ERC 5: Industrial use resulting in inclusion into or onto a matrix</p> <p>Use (SU): Other: 22</p>
Functional fluids	<p>Process category (PROC): PROC 1: Use in closed process, no likelihood of exposure</p>

Identified Use (IU) name	Use descriptors
	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 Environmental release category (ERC): ERC 7: Industrial use of substances in closed systems Sector of end use (SU): Other: 22
Uses by consumers	
Identified Use (IU) name	Use descriptors
Use as a fuel	Chemical product category (PC): PC 13: Fuels Environmental release category (ERC): ERC 9a: Wide dispersive indoor use of substances in closed systems ERC 9b: Wide dispersive outdoor use of substances in closed systems
Propellants	Chemical product category (PC): 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 Environmental release category (ERC): ERC 8a: Wide dispersive indoor use of processing aids in open systems