SAFETY DATA SHEET
According to EC No 1907/2006 as amended as at the date of this SDS

IP Extraction Feed

Version	Revision Date:	SDS Number:	Date of last issue: 23.01.2025
8.0	24.03.2025	800001001047	Print Date 01.04.2025

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

1.1 Product identifier

Trade name	:	IP Extraction Feed
Product code	:	X2156
Registration number EU	:	01-2119480190-46-0000, 01-2119480190-46-0001
Synonyms	:	Crude C5, Crude C5 Stream, Crude isoprene, Hydrocarbons C5-rich, IP Feed, Isoprene concentrate, Raw C5's

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

Use of the Substance/Mixture	:	Chemical intermediate., Raw material for use in the chemical industry., For use as a component in fuel. Please refer to section 16 and/or the annexes for the registered uses under REACH.
Uses advised against	:	Restricted to professional users., This product must not be used in applications other than the above without first seeking the advice of the supplier. This product must not be used in applications other than those listed in Section 1 without first seeking the advice of the supplier.

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier	:	**Shell Chemicals Europe B.V.** PO Box 2334 3000 CH Rotterdam Netherlands
Telephone	:	+31 (0)10 441 5137 / +31 (0)10 441 5191
Telefax	:	+31 (0)20 716 8316 / +31 (0)20 713 9230
Contact for Safety Data Sheet	:	sccmsds@shell.com

1.4 Emergency telephone number

+44 (0) 1235 239 670 (This telephone number is available 24 hours per day, 7 days per week)
Giftnotruf (Berlin): +49 (0) 30 3068 6700

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable liquids, Category 1	H224: Extremely flammable liquid and vapour.

Acute toxicity, Category 4, Oral	H302: Harmful if swallowed.
Aspiration hazard, Category 1	H304: May be fatal if swallowed and enters airways.
Acute toxicity, Category 4, Dermal	H312: Harmful in contact with skin.
Skin irritation, Category 2	H315: Causes skin irritation.
Eye irritation, Category 2	H319: Causes serious eye irritation.
Specific target organ toxicity - single exposure, Category 3	H335: May cause respiratory irritation. H336: May cause drowsiness or dizziness.
Germ cell mutagenicity, Category 2	H341: Suspected of causing genetic defects.
Carcinogenicity, Category 1B	H350: May cause cancer.
Reproductive toxicity, Category 2	H361: Suspected of damaging fertility or the unborn child.
Long-term (chronic) aquatic hazard, Category 2	H411: Toxic to aquatic life with long lasting effects.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard statements :

PHYSICAL HAZARDS:
H224 Extremely flammable liquid and vapour.
HEALTH HAZARDS:
H302 Harmful if swallowed.
H304 May be fatal if swallowed and enters airways.
H312 Harmful in contact with skin.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
H336 May cause drowsiness or dizziness.
H341 Suspected of causing genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
ENVIRONMENTAL HAZARDS:
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P243 Take action to prevent static discharges.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.
P302 + P352 IF ON SKIN: Wash with plenty of water and soap.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331 Do NOT induce vomiting.

Storage:

No precautionary phrases.

Disposal:

No precautionary phrases.

2.3 Other hazards

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

This material is a static accumulator.
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Will float and can be reignited on surface water.

SECTION 3: Composition/information on ingredients

3.1 Substances

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Hydrocarbons, C5-rich	68476-55-1 270-695-5 649-402-00-3	Flam. Liq. 1; H224 Acute Tox. 4; H302 Acute Tox. 4; H312	<= 100

	01-2119480190-46	Skin Irrit. 2; H315 Eye Irrit. 2; H319 Asp. Tox. 1; H304 Muta. 2; H341 Carc. 1B; H350 STOT SE 3; H335, H336 Aquatic Chronic 2; H411	

Further information

Contains:

Chemical name	Identification number	Classification	Concentration (% w/w)
Isoprene	78-79-5, 201-143-3	Flam. Liq.1; H224 Muta.2; H341 Carc.1B; H350 Aquatic Chronic2; H411	10 - 30
penta-1,3-diene	504-60-9, 207-995-2	Flam. Liq.2; H225	10 - 20
pentane	109-66-0, 203-692-4	Flam. Liq.1; H224 Asp. Tox.1; H304 STOT SE3; H336 Aquatic Chronic2; H411 EUH066	15 - 20
isopentane	78-78-4, 201-142-8	Flam. Liq.1; H224 Asp. Tox.1; H304 STOT SE3; H336 Aquatic Chronic2; H411	10 - 15
cyclopentadiene	542-92-7, 208-835-4	Flam. Liq.3; H226 Acute Tox.3; H301 Acute Tox.3; H311 Skin Irrit.2; H315 Eye Irrit.2; H319 STOT SE3; H335	5 - 12
Dicyclopentadi-	77-73-6, 201-052-9	Flam. Liq.2; H225	2 - 5

ene		Acute Tox.4; H302 Asp. Tox.1; H304 Acute Tox.2; H330 Skin Irrit.2; H315 Eye Irrit.2; H319 STOT SE3; H335 Repr.2; H361 STOT RE2; H373 Aquatic Acute1; H400 Aquatic Chronic2; H411 _____ M-Factor (Acute aquatic toxicity): 1	
Benzene	71-43-2, 200-753-7	Flam. Liq.2; H225 Asp. Tox.1; H304 Skin Irrit.2; H315 Eye Irrit.2; H319 Muta.1B; H340 Carc.1A; H350 STOT RE1; H372 Aquatic Chronic3; H412 _____	>= 0 - < 0,1
1,3-butadiene	106-99-0, 203-450-8	Flam. Gas1A; H220 Press. GasLiquefied gas; H280 Muta.1B; H340 Carc.1A; H350 _____	>= 0 - < 0,1
TBP (tert-butylphenol) - inhibitor	27178-34-3, 248-300-2	Acute Tox.4; H302 Acute Tox.4; H312 Acute Tox.4; H332 Skin Corr.1B; H314 Aquatic Chronic2; H411 _____	<= 0,015

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Not expected to be a health hazard when used under normal conditions.

Protection of first-aiders : When administering first aid, ensure that you are wearing the

appropriate personal protective equipment according to the incident, injury and surroundings.

If inhaled : Remove to fresh air. If rapid recovery does not occur, transport to nearest medical facility for additional treatment.

In case of skin contact : Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

In case of eye contact : Immediately flush eye(s) with plenty of water.
Remove contact lenses, if present and easy to do. Continue rinsing.
Transport to the nearest medical facility for additional treatment.

If swallowed : Call emergency number for your location / facility.
If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.
Rinse mouth.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, lightheadedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.

Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters.

Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.

Ingestion may result in nausea, vomiting and/or diarrhoea.
If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

Damage to blood-forming organs may be evidenced by: a) fatigue and anaemia (RBC), b) decreased resistance to infection, and/or excessive bruising and bleeding (platelet effect). Heart damage may be evidenced by shortness of breath and, in severe cases, by collapse (cardiac arrest).

4.3 Indication of any immediate medical attention and special treatment needed

Treatment	:	IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT! Call a doctor or poison control center for guidance. Potential for chemical pneumonitis. Treat symptomatically. Artificial respiration and/or oxygen may be necessary.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
Unsuitable extinguishing media	:	Do not use water in a jet.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	Carbon monoxide may be evolved if incomplete combustion occurs. Will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible. Flammable vapours may be present even at temperatures below the flash point.

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).
Specific extinguishing methods	:	Standard procedure for chemical fires.
Further information	:	Clear fire area of all non-emergency personnel. Keep adjacent containers cool by spraying with water.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions :

Observe all relevant local and international regulations.
Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.
Local authorities should be advised if significant spillages cannot be contained.
6.1.1 For non emergency personnel:
Avoid contact with skin, eyes and clothing.
Isolate hazard area and deny entry to unnecessary or unprotected personnel.
Do not breathe fumes, vapour.
Do not operate electrical equipment.
6.1.2 For emergency responders:
Avoid contact with skin, eyes and clothing.
Isolate hazard area and deny entry to unnecessary or unprotected personnel.
Do not breathe fumes, vapour.
Do not operate electrical equipment.

6.2 Environmental precautions

Environmental precautions : Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely

6.4 Reference to other sections

For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet., Risk of explosion. Inform the emergency services if liquid enters surface water drains., For guidance

on disposal of spilled material see Section 13 of this Safety Data Sheet., Vapour may form an explosive mixture with air.
Local authorities should be advised if significant spillages cannot be contained.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures	:	Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Ensure that all local regulations regarding handling and storage facilities are followed.
Advice on safe handling	:	Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Bulk storage tanks should be diked (bunded). Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations. Inhibitor levels should be maintained. Protect against light.
Product Transfer	:	If positive displacement pumps are used, these must be fitted

with a non-integral pressure relief valve. Refer to guidance under Handling section.

Hygiene measures : Wash hands before eating, drinking, smoking and using the toilet. Launder contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Storage class (TRGS 510) : 3, Flammable liquids

Further information on storage stability : Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment.
Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat.
Must be kept inhibited during storage and shipment as material can polymerise.
Vapours from tanks should not be released to atmosphere.
Breathing losses during storage should be controlled by a suitable vapour treatment system.
Nitrogen blanket recommended.
Electrostatic charges will be generated during pumping.
Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.
Reacts with atmospheric oxygen. Material contains a stabilizer to inhibit oxidative colour change.
Prolonged storage of the product can cause the stabiliser to lose its effectiveness.
The product is normally supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerise with heat evolution.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel.
Unsuitable material: Copper., Copper alloys.

7.3 Specific end use(s)

Specific use(s) : Please refer to section 16 and/or the annexes for the registered uses under REACH.

See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
Isoprene	78-79-5	AGW	3 ppm 8,4 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 8;(II)			
	Further information: Carcinogenic substance Cat. 1A or 1B or carcinogenic activity or procedure according to § 2 (3) No. 4 of the Hazardous Substances Ordinance - in addition, § 10 GefStoffV must be observed, Commission for dangerous substances			
Isoprene		TWA	3 ppm 8,4 mg/m3	Shell Internal Standard (SIS) for 8 hour TWA.
pentane	109-66-0	AGW	1.000 ppm 3.000 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			
	Further information: When there is compliance with the OEL and biological tolerance values, there is no risk of harming the unborn child			
pentane		AGW	1.500 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			
	Further information: Group exposure limit for hydrocarbon solvent mixtures, Commission for dangerous substances, See also No. 2.9 of the TRGS 900			
pentane		TWA	1.000 ppm 3.000 mg/m3	2006/15/EC
	Further information: Indicative			
pentane		MAK	1.000 ppm 3.000 mg/m3	DE DFG MAK
	Peak-limit: excursion factor (category): 2; II			
	Further information: Damage to the embryo or foetus is unlikely when the MAK value or the BAT value is observed			
isopentane	78-78-4	AGW	1.000 ppm 3.000 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			
isopentane		AGW	1.500 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 2;(II)			
	Further information: Group exposure limit for hydrocarbon solvent mixtures, Commission for dangerous substances, See also No. 2.9 of the TRGS 900			
isopentane		TWA	1.000 ppm 3.000 mg/m3	2006/15/EC
	Further information: Indicative			
Dicyclopentadiene	77-73-6	AGW	0,5 ppm 2,7 mg/m3	DE TRGS 900
	Peak-limit: excursion factor (category): 1;(I)			

Benzene	71-43-2	Acceptable concentration	0,06 ppm 0,2 mg/m3	DE TRGS 910
	Further information: Skin-resorptive			
Benzene		Tolerable concentration	0,6 ppm 1,9 mg/m3	DE TRGS 910
	Peak-limit: excursion factor (category): 8 - Excursion factor according to Number 3.2.6			
	Further information: Skin-resorptive			
Benzene		TWA	0,25 ppm 0,8 mg/m3	Shell Internal Standard (SIS) for 8-12 hour TWA.
Benzene		STEL	2,5 ppm 8 mg/m3	Shell Internal Standard (SIS) for 15 min (STEL)
1,3-butadiene	106-99-0	Acceptable concentration	0,2 ppm 0,5 mg/m3	DE TRGS 910
1,3-butadiene		Tolerable concentration	2 ppm 5 mg/m3	DE TRGS 910
	Peak-limit: excursion factor (category): 8 - Excursion factor according to Number 3.2.6			
	Further information: Substances that cause cancer in man and can be assumed to contribute to cancer risk, Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals			

Biological occupational exposure limits

Substance name	CAS-No.	Control parameters	Sampling time	Basis
Benzene	71-43-2	Benzene: 5 µg/l (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift	TRGS 910
		Benzene: 0,8 µg/l (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift	TRGS 910
		S-phenylmercapturic acid: 25 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift	TRGS 910
		S-phenylmercapturic acid: 3 µg/g creatinine (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift	TRGS 910
		trans,trans-muconic acid: 500 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of	TRGS 910

			shift	
1,3-butadiene	106-99-0	3,4-dihydroxybutylmercapturic acid (DHBMA): 2900 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift, Equivalence Value for Tolerable concentration: with long-term exposure: at the end of the shift after several previous shifts	TRGS 910
		3,4-dihydroxybutylmercapturic acid (DHBMA): 600 µg/g creatinine (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift, Equivalence Value for Acceptance concentration: with long-term exposure: at the end of the shift after several previous shifts	TRGS 910
		2-hydroxy-3-butenyl-mercapturic acid (MHBMA): 80 µg/g creatinine (Urine)	Equivalence Value for Tolerable concentration: end of exposure or end of shift, Equivalence Value for Tolerable concentration: with long-term exposure: at the end of the shift after several previous shifts	TRGS 910
		2-hydroxy-3-butenyl-mercapturic acid (MHBMA): 10 µg/g creatinine (Urine)	Equivalence Value for Acceptance concentration: end of exposure or end of shift, Equivalence Value for Acceptance concentration: with long-term exposure: at the end of the shift after several previous shifts	TRGS 910

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
IP Extraction Feed	Workers	Dermal	Long-term systemic	0,34 mg/kg

			effects	bw/day
IP Extraction Feed	Workers	Inhalation	Long-term systemic effects	8,4 mg/m3

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
Remarks:	Substance is a hydrocarbon with a complex, unknown or variable composition. Conventional methods of deriving PNECs are not appropriate and it is not possible to identify a single representative PNEC for such substances.	

8.2 Exposure controls

Engineering measures

Read in conjunction with the Exposure Scenario for your specific use contained in the Annex.
Use sealed systems as far as possible.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Eye washes and showers for emergency use.
Firewater monitors and deluge systems are recommended.
Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include:
General Information
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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely.Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.

Personal protective equipment

Read in conjunction with the Exposure Scenario for your specific use contained in the Annex.
The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards.

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Eye protection : Wear goggles for use against liquids and gas.
Wear full face shield if splashes are likely to occur.
Approved to EU Standard EN166.

Hand protection

Remarks : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374,

US: F739) made from the following materials may provide suitable chemical protection. Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber gloves. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Skin and body protection : Wear chemical and cold resistant gloves/gauntlets, and boots, and apron.
Protective clothing approved to EU Standard EN14605.

Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.
Check with respiratory protective equipment suppliers.
Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.
Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.
If air-filtering respirators are suitable for conditions of use: Select a filter suitable for organic gases and vapours [Type AX boiling point < 65°C (149°F)] meeting EN14387.

Thermal hazards : Not applicable

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state : Liquid.

Colour	:	Colourless to light coloured
Odour	:	strong
Odour Threshold	:	not determined
Melting point/freezing point	:	Data not available
Boiling point/boiling range	:	34 - 60 °C
Flammability		
Flammability (solid, gas)	:	Data not available
Lower explosion limit and upper explosion limit / flammability limit		
Upper explosion limit / Upper flammability limit	:	12 %(V)
Lower explosion limit / Lower flammability limit	:	1 %(V)
Flash point	:	< -20 °C
Auto-ignition temperature	:	> 200 °C
Decomposition temperature		
Decomposition temperature	:	Data not available
pH	:	Data not available
Viscosity		
Viscosity, dynamic	:	Typical 0,25 mPa.s (0 °C) Method: ASTM D445
		Typical 0,22 mPa.s (20 °C) Method: ASTM D445
Viscosity, kinematic	:	Data not available
Solubility(ies)		
Water solubility	:	insoluble
Solubility in other solvents	:	Data not available
Partition coefficient: n-octanol/water	:	Data not available
		Data not available
Vapour pressure	:	58,4 kPa (20 °C)

Relative density	:	0,7 (20,0 °C) Method: ASTM D4052
Density	:	678 kg/m3 (20 °C) Method: ASTM D4052
Relative vapour density	:	2,3
Particle characteristics		
Particle size	:	Data not available

9.2 Other information

Explosive properties	:	Classification Code: Not classified
Oxidizing properties	:	Data not available
Evaporation rate	:	Data not available
Conductivity	:	Low conductivity: < 100 pS/m The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Surface tension	:	Data not available
Molecular weight	:	Data not available

SECTION 10: Stability and reactivity

10.1 Reactivity

Prolonged exposure to air may lead to peroxide formation.
Reacts with strong oxidising agents.

10.2 Chemical stability

The product is normally supplied in a stabilized form. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerise with heat evolution.
Reacts violently with:
Nitric, sulphuric and chlorosulphuric acids.
Oxidises on contact with air to form unstable peroxides.
Polymerisation may occur at elevated temperatures.
Normally stable under ambient conditions and if properly inhibited.

10.3 Possibility of hazardous reactions

Hazardous reactions	:	Normally stable under ambient conditions and if properly in-

hibited.

10.4 Conditions to avoid

Conditions to avoid : Heat, flames, and sparks.
Exposure to air.
Exposure to sunlight.
In certain circumstances product can ignite due to static electricity.

10.5 Incompatible materials

Materials to avoid : Strong oxidising agents.
Strong acids.
Strong bases.
Copper alloys

10.6 Hazardous decomposition products

Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on likely routes of exposure : Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute toxicity

Product:

Acute oral toxicity : LD50 (Rat, male and female): > 300 - 2.000 mg/kg
Method: Test(s) equivalent or similar to OECD Test Guideline 401
Remarks: Harmful if swallowed.

Acute inhalation toxicity : Remarks: May be harmful if inhaled.

Acute dermal toxicity : LD50 (Rabbit, male): 1.183 mg/kg
Method: Literature data
Remarks: Harmful in contact with skin.

Components:

Hydrocarbons, C5-rich:

Acute oral toxicity : LD 50 (Rat, male and female): >300 <=2000 mg/kg

Method: Test(s) equivalent or similar to OECD Test Guideline 401
Remarks: Harmful if swallowed.

Acute inhalation toxicity : LC 50 (Rat, male and female): > 20 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Test(s) equivalent or similar to OECD Test Guideline 403
Remarks: Based on available data, the classification criteria are not met.

Acute dermal toxicity : LD 50 (Rabbit, male): 1.183 mg/kg
Method: Literature data
Remarks: Harmful in contact with skin.

Skin corrosion/irritation

Product:

Species : Rabbit
Method : Literature data
Remarks : Harmful in contact with skin.

Components:

Hydrocarbons, C5-rich:

Species : Rabbit
Method : OECD Test Guideline 404
Remarks : Causes skin irritation.

Serious eye damage/eye irritation

Product:

Species : Rabbit
Method : Literature data
Remarks : Causes serious eye irritation.

Components:

Hydrocarbons, C5-rich:

Species : Rabbit
Method : Literature data
Remarks : Causes serious eye irritation.

Respiratory or skin sensitisation

Product:

Species : Guinea pig
Method : Test(s) equivalent or similar to OECD Test Guideline 406
Remarks : Based on available data, the classification criteria are not met.

Components:

Hydrocarbons, C5-rich:

Species	:	Guinea pig
Method	:	Test(s) equivalent or similar to OECD Test Guideline 406
Remarks	:	Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Product:

Genotoxicity in vitro	:	Method: Test(s) equivalent or similar to OECD Test Guideline 473 Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo and in-vitro assays. Method: Literature data Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo and in-vitro assays.
Genotoxicity in vivo	:	Species: Mouse Method: OECD Test Guideline 474 Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo assays. Species: Mouse Method: Test(s) equivalent or similar to OECD Test guideline 478 Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo assays.
Germ cell mutagenicity- Assessment	:	Weight of evidence does not support classification as a germ cell mutagen.

Components:

Hydrocarbons, C5-rich:

Genotoxicity in vitro	:	Method: Test(s) equivalent or similar to OECD Test Guideline 473 Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo and in-vitro assays. Method: Literature data Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo and in-vitro assays.
Genotoxicity in vivo	:	Species: Mouse Method: OECD Test Guideline 474 Remarks: Suspected of causing genetic defects. Mutagenic; positive in in-vivo assays.

Species: Mouse
Method: Test(s) equivalent or similar to OECD Test guideline 478
Remarks: Suspected of causing genetic defects.
Mutagenic; positive in in-vivo assays.

Germ cell mutagenicity- Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity

Product:

Species	:	Mouse, male and female
Application Route	:	Inhalation
Method	:	Other guideline method.
Remarks	:	May cause cancer. IARC Group 2B: Possibly carcinogenic to humans.
Species	:	Rat, male and female
Application Route	:	Inhalation
Method	:	Test(s) equivalent or similar to OECD Test Guideline 453
Remarks	:	May cause cancer. IARC Group 2B: Possibly carcinogenic to humans.
Carcinogenicity - Assessment	:	May cause cancer.

Components:

Hydrocarbons, C5-rich:

Species	:	Mouse, male and female
Application Route	:	Inhalation
Method	:	Other guideline method.
Remarks	:	May cause cancer. IARC Group 2B: Possibly carcinogenic to humans.
Species	:	Rat, male and female
Application Route	:	Inhalation
Method	:	Test(s) equivalent or similar to OECD Test Guideline 453
Remarks	:	May cause cancer. IARC Group 2B: Possibly carcinogenic to humans.
Carcinogenicity - Assessment	:	May cause cancer.

Material	GHS/CLP Carcinogenicity Classification
Hydrocarbons, C5-rich	Carcinogenicity Category 1B
Isoprene	Carcinogenicity Category 1B

penta-1,3-diene	No carcinogenicity classification.
pentane	No carcinogenicity classification.
isopentane	No carcinogenicity classification.
Other C5 Hydrocarbons	No carcinogenicity classification.
cyclopentadiene	No carcinogenicity classification.
Dicyclopentadiene	No carcinogenicity classification.
Benzene	Carcinogenicity Category 1A
1,3-butadiene	Carcinogenicity Category 1A
TBP (tert-butylphenol) - inhibitor	No carcinogenicity classification.

Material	Other Carcinogenicity Classification
Hydrocarbons, C5-rich	IARC: Group 2B: Possibly carcinogenic to humans
Isoprene	IARC: Group 2B: Possibly carcinogenic to humans
Benzene	IARC: Group 1: Carcinogenic to humans
1,3-butadiene	IARC: Group 1: Carcinogenic to humans

Reproductive toxicity

Product:

Effects on fertility : Remarks: Suspected of damaging fertility or the unborn child.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Components:

Hydrocarbons, C5-rich:

Effects on fertility : Species: Rat
Sex: male and female
Application Route: Inhalation

Method: OECD Test Guideline 422
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Product:

Exposure routes	:	Inhalation
Target Organs	:	Central nervous system, Respiratory Tract
Remarks	:	High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea. Inhalation of vapours or mists may cause irritation to the respiratory system. May cause drowsiness and dizziness. May cause respiratory irritation.

Components:

Hydrocarbons, C5-rich:

Exposure routes	:	Inhalation
Target Organs	:	Central nervous system, Respiratory Tract
Remarks	:	Inhalation of vapours or mists may cause irritation to the respiratory system. May cause drowsiness or dizziness. May cause respiratory irritation. High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea.

STOT - repeated exposure

Product:

Remarks	:	Based on available data, the classification criteria are not met.

Components:

Hydrocarbons, C5-rich:

Remarks	:	Based on available data, the classification criteria are not met.

Repeated dose toxicity

Product:

Species	:	Rat, male and female
Application Route	:	Oral
Method	:	Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs	:	No specific target organs noted

Species	:	Rat, male and female
Application Route	:	Inhalation
Method	:	Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs	:	No specific target organs noted

Components:

Hydrocarbons, C5-rich:

Species	:	Rat, male and female
Application Route	:	Oral
Method	:	Test(s) equivalent or similar to OECD Test Guideline 422

Target Organs	:	No specific target organs noted
Species	:	Rat, male and female
Application Route	:	Inhalation
Test atmosphere	:	vapour
Method	:	Test(s) equivalent or similar to OECD Test Guideline 422
Target Organs	:	No specific target organs noted

Aspiration toxicity

Product:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Components:

Hydrocarbons, C5-rich:

Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

11.2 Information on other hazards

Endocrine disrupting properties

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Further information

Product:

Remarks	:	Classifications by other authorities under varying regulatory frameworks may exist.
Remarks	:	Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Components:

Hydrocarbons, C5-rich:

Remarks	:	Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12: Ecological information

12.1 Toxicity

Components:

Hydrocarbons, C5-rich:

Toxicity to fish	:	LL50 (Oncorhynchus mykiss (rainbow trout)): 14,1 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 4,7 mg/l Exposure time: 48 h Method: OECD Test Guideline 202 Remarks: Toxic LL/EL/IL50 > 1 <= 10 mg/l
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (algae)): 12,4 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 Remarks: Harmful LL/EL/IL50 >10 <= 100 mg/l
Toxicity to microorganisms	:	NOELR (Activated sludge, domestic waste): 2 mg/l Exposure time: 5 h Method: OECD Test Guideline 301D Remarks: Data not available
Toxicity to fish (Chronic toxicity)	:	Remarks: Data not available
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	Remarks: Data not available

12.2 Persistence and degradability

Components:

Hydrocarbons, C5-rich:

Biodegradability	:	Biodegradation: 9 % Exposure time: 28 d Method: OECD Test Guideline 301D Remarks: Not readily biodegradable.

12.3 Bioaccumulative potential

Components:

Hydrocarbons, C5-rich:

Bioaccumulation : Species: Pimephales promelas (fathead minnow)
Bioconcentration factor (BCF): 1,2 - 2,1
Method: Based on quantitative structure-activity relationship (QSAR) modelling
Remarks: Does not bioaccumulate significantly.

12.4 Mobility in soil

Components:

Hydrocarbons, C5-rich:

Mobility : Remarks: Floats on water.

12.5 Results of PBT and vPvB assessment

Components:

Hydrocarbons, C5-rich:

Assessment : The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB..

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Product:

Additional ecological information : Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Recover or recycle if possible.
It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Do not dispose into the environment, in drains or in water courses.
Waste product should not be allowed to contaminate soil or water.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.
Local regulations may be more stringent than regional or national requirements and must be complied with.

SECTION 14: Transport information

14.1 UN number or ID number

ADN	:	3295
ADR	:	3295
RID	:	3295
IMDG	:	3295
IATA	:	3295

14.2 UN proper shipping name

ADN	:	HYDROCARBONS, LIQUID, N.O.S. (CONTAINING ISOPRENE AND PENTADIENE STABILIZED)
ADR	:	HYDROCARBONS, LIQUID, N.O.S.
RID	:	HYDROCARBONS, LIQUID, N.O.S.
IMDG	:	HYDROCARBONS, LIQUID, N.O.S. ((hydrocarbons, C5-rich)
IATA	:	HYDROCARBONS, LIQUID, N.O.S.

14.3 Transport hazard class(es)

ADN	:	3
ADR	:	3
RID	:	3
IMDG	:	3
IATA	:	3

14.4 Packing group

ADN

Packing group	:	I
Classification Code	:	F1
Labels	:	3 (INST, N2, CMR)
CDNI Inland Water Waste Agreement	:	NST 8963 Solvent

ADR

Packing group : I
Classification Code : F1
Hazard Identification Number : 33
Labels : 3

RID
Packing group : I
Classification Code : F1
Hazard Identification Number : 33
Labels : 3

IMDG
Packing group : I
Labels : 3

IATA
Packing group : I
Labels : 3

14.5 Environmental hazards

ADN
Environmentally hazardous : yes

ADR
Environmentally hazardous : yes

RID
Environmentally hazardous : yes

IMDG
Marine pollutant : yes

14.6 Special precautions for user

Remarks : Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

14.7 Maritime transport in bulk according to IMO instruments

Pollution category : Y
Ship type : 2
Product name : IP Extraction Feed (contains Isoprene; 1,3-Cyclopentadiene dimer (molten))

Additional Information : This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.

Transport in bulk according to Annex II of Marpol and the IBC Code

SECTION 15: Regulatory information

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

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	:	Conditions of restriction for the following entries should be considered: Hydrocarbons, C5-rich (Number on list 29, 28) Isoprene (Number on list 28) 1,3-butadiene (Number on list 29, 28) Benzene (Number on list 72, 5, 29, 28)
REACH - List of substances subject to authorisation (Annex XIV)	:	Product is not subject to Authorisation under REACH.
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.	P5a	FLAMMABLE LIQUIDS
	E1	ENVIRONMENTAL HAZARDS

Water hazard class (Germany)	:	WGK 3 highly hazardous to water Remarks: Code Number: 8446, Classification according to AwSV

Other regulations:

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Product is subject to Betriebs-Sicherheits-Verordnung (BetrSichV).
Compliance with paragraph 22 of Youth Employment Law.
Take note of Law on the protection of mothers at work, in education and in studies (Maternity Protection Act - MuSchG).
Product is subject to Stoerfallverordnung (12. BImSchV) based on Seveso III directive (2012/18/EU).

The product is subject to the supply restrictions of the Ordinance on the Prohibition of Chemicals.

The components of this product are reported in the following inventories:

AIIC	:	Listed
DSL	:	Listed
TSCA	:	Listed
IECSC	:	Listed
TCSI	:	Listed

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of other abbreviations

2006/15/EC	:	Europe. Indicative occupational exposure limit values
DE DFG MAK	:	Germany. MAK BAT Annex IIa
DE TRGS 900	:	Germany. TRGS 900 - Occupational exposure limit values.
DE TRGS 910	:	Germany. TRGS 910 - Substance-specific acceptable and tolerable concentrations and equivalence values for carcinogenic hazardous substances.
TRGS 910	:	Germany. TRGS 910 - Substance-specific acceptable and tolerable concentrations and equivalence values for carcinogenic hazardous substances
2006/15/EC / TWA	:	Limit Value - eight hours
DE DFG MAK / MAK	:	MAK value
DE TRGS 900 / AGW	:	Time Weighted Average
DE TRGS 910 / Acceptable concentration	:	Acceptable concentration
DE TRGS 910 / Tolerable concentration	:	Tolerable concentration

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization;

KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Training advice : Provide adequate information, instruction and training for operators.

Other information : For Industry guidance and tools on REACH please visit the CEFIC website at http://cefic.org/Industry-support.
The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

A vertical bar (|) in the left margin indicates an amendment from the previous version.

This product is classified as R22/H302 Harmful if swallowed. The same control advice applies to all uses of this product and is included in Section 8 of the SDS. An exposure scenario is not presented.

There has been an increase in the Health Hazard classification of this product in section 2. Ensure that the related sections (particularly sections 4, 8 & 11) are carefully studied.

Sources of key data used to compile the Safety Data Sheet : The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

Classification of the mixture:		**Classification procedure:**
Flam. Liq. 1	H224	On basis of test data.
Acute Tox. 4	H302	Expert judgement and weight of evidence determination.
Asp. Tox. 1	H304	Expert judgement and weight of evidence determination.
Acute Tox. 4	H312	Expert judgement and weight of evi-

		dence determination.
Skin Irrit. 2	H315	Expert judgement and weight of evidence determination.
Eye Irrit. 2	H319	Expert judgement and weight of evidence determination.
STOT SE 3	H335, H336	Expert judgement and weight of evidence determination.
Muta. 2	H341	Expert judgement and weight of evidence determination.
Carc. 1B	H350	Expert judgement and weight of evidence determination.
Repr. 2	H361	Expert judgement and weight of evidence determination.
Aquatic Chronic 2	H411	Expert judgement and weight of evidence determination.

Identified Uses according to the Use Descriptor System
Uses - Worker
Title : Manufacture of substance
- Industrial

Uses - Worker
Title : Use as an intermediate
- Industrial

Uses - Worker
Title : Distribution of substance
- Industrial

Uses - Worker
Title : Use as a fuel
- Industrial

Uses - Worker
Title : Polymer production
- Industrial

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Exposure Scenario - Worker

300000000347	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Manufacture of substance- Industrial
Use Descriptor	**Sector of Use**: SU 3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC1, ESVOC SpERC 1.1.v1
Scope of process	Manufacture of the substance or use as a process chemical or extraction agent within closed or contained systems. Includes incidental exposures during recycling/ recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Section 2.1	**Control of Worker Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers use of substance/product up to 100% (unless stated differently).,
Frequency and Duration of Use	
Covers daily exposures up to 8 hours (unless stated differently).	
Other Operational Conditions affecting Exposure	
Assumes a good basic standard of occupational hygiene is implemented.	
Contributing Scenarios	**Risk Management Measures**
General measures (carcinogens).	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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and maintain all control measures. Consider the need for risk based health surveillance.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if

	hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	Handle substance within a closed system.
General exposures (closed systems)with sample collectionGeneral measures (skin irritants).	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Ensure operation is undertaken outdoors.
General exposures (closed systems)Use in contained batch processes	Handle substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Avoid carrying out activities involving exposure for more than 4 hours
Process sampling	Sample via a closed loop or other system to avoid exposure Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour.
Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).
Bulk transfers(closed systems)	Ensure material transfers are under containment or extract ventilation. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance. Ensure operation is undertaken outdoors. Clear spills immediately. Wear a respirator conforming to EN140 with Type A filter or better. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage.General measures (skin irritants).	Store substance within a closed system. Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors.
Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	

Predominantly hydrophobic.	
Not readily biodegradable.	
Amounts Used	
Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tonnes/year):	5E+04
Fraction of Regional tonnage used locally:	1
Annual site tonnage (tonnes/year):	5E+04
Maximum daily site tonnage (kg/day):	1,7E+05
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	40
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	5,0E-02
Release fraction to wastewater from process (initial release prior to RMM):	3,0E-03
Release fraction to soil from process (initial release prior to RMM):	1,0E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by wastewater treatment plant microbes.	
Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	75,3
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,5
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	9,2E+05
Assumed domestic sewage treatment plant flow (m3/d)	10.000
Conditions and Measures related to external treatment of waste for disposal	
During manufacturing no waste of the substance is generated.	
Conditions and measures related to external recovery of waste	

During manufacturing no waste of the substance is generated.

SECTION 3	EXPOSURE ESTIMATION

Section 3.1 - Health

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

Section 3.2 -Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

SECTION 4	GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Section 4.2 -Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.

Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000352	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as an intermediate- Industrial
Use Descriptor	**Sector of Use**: SU 3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC6a, ESVOC SpERC 6.1a.v1
Scope of process	Use of substance as an intermediate within closed or contained systems (not related to Strictly Controlled Conditions). Includes incidental exposures during recycling/recovery, material transfers, storage, sampling, associated laboratory activities, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Section 2.1	**Control of Worker Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers use of substance/product up to 100% (unless stated differently).,
Frequency and Duration of Use	
Covers daily exposures up to 8 hours (unless stated differently).	
Other Operational Conditions affecting Exposure	
Assumes a good basic standard of occupational hygiene is implemented.	
Contributing Scenarios	**Risk Management Measures**
General measures (carcinogens).	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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and maintain all control measures. Consider the need for risk based health surveillance.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if

	hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	Handle substance within a closed system.
General exposures (closed systems)with sample collectionGeneral measures (skin irritants).	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Ensure operation is undertaken outdoors.
General exposures (closed systems)Use in contained batch processes	Handle substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Avoid carrying out activities involving exposure for more than 4 hours
Process sampling	Sample via a closed loop or other system to avoid exposure Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour.
Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).
Bulk transfers(closed systems)	Ensure material transfers are under containment or extract ventilation. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance. Ensure operation is undertaken outdoors. Clear spills immediately. Wear a respirator conforming to EN140 with Type A filter or better. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage.General measures (skin irritants).	Store substance within a closed system. Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors.
Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	

Predominantly hydrophobic.	
Not readily biodegradable.	
Amounts Used	
Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tonnes/year):	2E+04
Fraction of Regional tonnage used locally:	0,75
Annual site tonnage (tonnes/year):	1,5E+04
Maximum daily site tonnage (kg/day):	5E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	2,5E-02
Release fraction to wastewater from process (initial release prior to RMM):	3E-03
Release fraction to soil from process (initial release prior to RMM):	1E-03
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	80
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	90,8
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,5
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1E+05
Assumed domestic sewage treatment plant flow (m3/d)	2.000
Conditions and Measures related to external treatment of waste for disposal	
This substance is consumed during use and no waste of substance is generated.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of substance is generated.	

SECTION 3	EXPOSURE ESTIMATION

Section 3.1 - Health

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

Section 3.2 -Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

SECTION 4	GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Section 4.2 -Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.

Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000000350	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Distribution of substance- Industrial
Use Descriptor	**Sector of Use**: SU 3, SU8, SU9 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 15 **Environmental Release Categories**: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC7, ESVOC SpERC 1.1b.v1
Scope of process	Bulk loading (including marine vessel/barge, rail/road car and IBC loading) of substance within closed or contained systems, including incidental exposures during its sampling, storage, unloading, maintenance and associated laboratory activities.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Section 2.1	**Control of Worker Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa at STP
Concentration of the Substance in Mixture/Article	Covers use of substance/product up to 100% (unless stated differently).,
Frequency and Duration of Use	
Covers daily exposures up to 8 hours (unless stated differently).	
Other Operational Conditions affecting Exposure	
Assumes a good basic standard of occupational hygiene is implemented.	
Contributing Scenarios	**Risk Management Measures**
General measures (carcinogens).	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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and maintain all control measures. Consider the need for risk based health surveillance.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamina-

	tion/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	Handle substance within a closed system.
General exposures (closed systems)with sample collectionGeneral measures (skin irritants).	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
General exposures (closed systems)Use in contained batch processes	Handle substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Sample via a closed loop or other system to avoid exposure Avoid carrying out activities involving exposure for more than 1 hour.
Process sampling	Sample via a closed loop or other system to avoid exposure Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour.
Laboratory activities	Handle within a fume cupboard or implement suitable equivalent methods to minimise exposure.
Bulk transfers(closed systems)	Clear transfer lines prior to de-coupling. Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors.
Drum and small package filling	Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance. Ensure operation is undertaken outdoors. Wear a respirator conforming to EN140 with Type A filter or better. Clear spills immediately. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage.General measures (skin irritants).	Store substance within a closed system. Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Not readily biodegradable.	
Amounts Used	
Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tonnes/year):	5E+04
Fraction of Regional tonnage used locally:	2E-03
Annual site tonnage (tonnes/year):	1E+02
Maximum daily site tonnage (kg/day):	5,0E+03
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	20
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1E-03
Release fraction to wastewater from process (initial release prior to RMM):	1E-05
Release fraction to soil from process (initial release prior to RMM):	1E-05
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	90
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	0
If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.	0
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,5
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3,1E+07
Assumed domestic sewage treatment plant flow (m3/d)	2.000
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	

External recovery and recycling of waste should comply with applicable local and/or regional regulations.

SECTION 3	EXPOSURE ESTIMATION

Section 3.1 - Health

The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.

Section 3.2 -Environment

The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

SECTION 4	GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Section 4.2 -Environment

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.

Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.

Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org).

Exposure Scenario - Worker

300000010376	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Use as a fuel- Industrial
Use Descriptor	**Sector of Use**: SU 3, SU 10 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 16 **Environmental Release Categories**: ERC7, ESVOC SpERC 7.12a.v1
Scope of process	Covers the use as a fuel (or fuel additive) and includes activities associated with its transfer, use, equipment maintenance and handling of waste.

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Section 2.1	**Control of Worker Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa
Concentration of the Substance in Mixture/Article	Covers use of substance/product up to 100% (unless stated differently).,
Frequency and Duration of Use	
Covers daily exposures up to 8 hours (unless stated differently).	
Other Operational Conditions affecting Exposure	
Assumes a good basic standard of occupational hygiene is implemented.	
Contributing Scenarios	**Risk Management Measures**
General measures (carcinogens).	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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and maintain all control measures. Consider the need for risk based health surveillance.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to pre-

	vent / minimise exposures and to report any skin problems that may develop.
General exposures (closed systems)	Handle substance within a closed system.
General exposures (closed systems)with sample collectionwith occasional controlled exposure.	Handle substance within a closed system. Sample via a closed loop or other system to avoid exposure Ensure operation is undertaken outdoors.
General exposures (closed systems)Use in contained batch processes	Handle substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Avoid carrying out activities involving exposure for more than 4 hours
Process sampling	Sample via a closed loop or other system to avoid exposure Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Avoid carrying out activities involving exposure for more than 1 hour.
Drum/batch transfers	Use drum pumps. Limit the substance content in the product to 25 %. Provide extract ventilation to material transfer points and other openings. Ensure material transfers are under containment or extract ventilation.
Bulk transfers(closed systems)	Ensure material transfers are under containment or extract ventilation. Clear transfer lines prior to de-coupling. Ensure operation is undertaken outdoors.
Equipment cleaning and maintenance	Drain down and flush system prior to equipment opening or maintenance. Ensure operation is undertaken outdoors. Clear spills immediately. Wear a respirator conforming to EN140 with Type A filter or better. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage.with occasional controlled exposure.	Store substance within a closed system. Ensure material transfers are under containment or extract ventilation. Ensure operation is undertaken outdoors.
Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	

Not readily biodegradable.	
Amounts Used	
Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tonnes/year):	1E+04
Fraction of Regional tonnage used locally:	1
Annual site tonnage (tonnes/year):	1E+04
Maximum daily site tonnage (kg/day):	3,3E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	5E-02
Release fraction to wastewater from process (initial release prior to RMM):	1E-05
Release fraction to soil from process (initial release prior to RMM):	0E+00
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	95
Treat air emission to provide a typical removal efficiency of (%)	95
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	0
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,5
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	3,1E+07
Assumed domestic sewage treatment plant flow (m3/d)	2E+03
Conditions and Measures related to external treatment of waste for disposal	
This substance is consumed during use and no waste of substance is generated.	
Conditions and measures related to external recovery of waste	
This substance is consumed during use and no waste of substance is generated.	

SECTION 3	**EXPOSURE ESTIMATION**
Section 3.1 - Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise	

indicated.

Section 3.2 -Environment
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**
Section 4.1 - Health	
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.	

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).

Exposure Scenario - Worker

300000010377	
SECTION 1	**EXPOSURE SCENARIO TITLE**
Title	Polymer production- Industrial
Use Descriptor	**Sector of Use**: SU 3, SU 10 **Process Categories**: PROC 1, PROC 2, PROC 3, PROC 5, PROC 6, PROC8a, PROC8b, PROC9, PROC14, PROC21 **Environmental Release Categories**: ERC6a, ERC6c, ESVOC SpERC 4.20.v1
Scope of process	Manufacture of polymers from monomers in continuous and batch processes. Including production, re-cycling and recovery, degassing, discharging, reactor maintenance and immediate polymer product formation (i.e. compounding, pelletisation, product off-gassing). Professional application of coatings and inks

SECTION 2	**OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES**
Section 2.1	**Control of Worker Exposure**
Product Characteristics	
Physical form of product	Liquid, vapour pressure > 10 kPa
Concentration of the Substance in Mixture/Article	Covers use of substance/product up to 100% (unless stated differently).,
Frequency and Duration of Use	
Covers daily exposures up to 8 hours (unless stated differently).	
Other Operational Conditions affecting Exposure	
Assumes a good basic standard of occupational hygiene is implemented.	
Contributing Scenarios	**Risk Management Measures**
General measures (carcinogens).	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. Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenarios; clear up spills immediately and maintain all control measures. Consider the need for risk based health surveillance.
General measures (skin irritants).	Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if

	hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin problems that may develop.
Bulk transferstransportwith sample collection	Ensure material transfers are under containment or extract ventilation. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
General exposures (closed systems)	Handle substance within a closed system.
Polymerisation (bulk and batch)Continuous processwith sample collection	Provide extract ventilation to material transfer points and other openings. Ensure operation is undertaken outdoors. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Polymerisation (bulk and batch)Batch processwith sample collection	Provide extract ventilation to material transfer points and other openings. Ensure operation is undertaken outdoors. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Finishing operationsBatch processwith sample collectionCatalyst inactivation and removal, washing and stripping / distillation to remove unreacted monomer	Provide extraction ventilation at points where emissions occur. Ensure operation is undertaken outdoors. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Intermediate polymer storage	Limit the substance content in the product to 5 %. Provide extraction ventilation at points where emissions occur. Store substance within a closed system.
Additivation and stabilisation	Limit the substance content in the product to 5 %. Provide extraction ventilation at points where emissions occur. Ensure operation is undertaken outdoors. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Mixing in containers.Batch process	Limit the substance content in the product to 5 %. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Provide extraction ventilation at points where emissions occur.

PelletizingExtrusion and masterbatching	Limit the substance content in the product to 5 %. Provide a good standard of controlled ventilation (10 to 15 air changes per hour). Provide extraction ventilation at points where emissions occur.
Pelletisation and pellet screening(open systems)	Limit the substance content in the product to 5 %. Ensure material transfers are under containment or extract ventilation.
Equipment maintenance	Drain down and flush system prior to equipment opening or maintenance. Clear spills immediately. Wear a respirator conforming to EN140 with Type A filter or better. Retain drain downs in sealed storage pending disposal or for subsequent recycle.
Storage.with occasional controlled exposure.	Limit the substance content in the product to 5 %. Store substance within a closed system. Avoid carrying out activities involving exposure for more than 1 hour.

Section 2.2	**Control of Environmental Exposure**
Substance is complex UVCB.	
Predominantly hydrophobic.	
Not readily biodegradable.	
Amounts Used	
Fraction of EU tonnage used in region:	0,1
Regional use tonnage (tonnes/year):	2E+04
Fraction of Regional tonnage used locally:	0,75
Annual site tonnage (tonnes/year):	1,5E+04
Maximum daily site tonnage (kg/day):	5E+04
Frequency and Duration of Use	
Continuous release.	
Emission Days (days/year):	300
Environmental factors not influenced by risk management	
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Other Operational Conditions affecting Environmental Exposure	
Release fraction to air from process (initial release prior to RMM):	1E-02
Release fraction to wastewater from process (initial release prior to RMM):	3E-03
Release fraction to soil from process (initial release prior to RMM):	1E-04
Technical conditions and measures at process level (source) to prevent release	
Common practices vary across sites thus conservative process release estimates used.	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Risk from environmental exposure is driven by freshwater sediment.	

Prevent discharge of undissolved substance to or recover from onsite wastewater.	
If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
Treat air emission to provide a typical removal efficiency of (%)	80
Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of >= (%)	90,8
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and Measures related to municipal sewage treatment plant	
Estimated substance removal from wastewater via domestic sewage treatment (%)	95,5
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)	95,5
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d)	1E+05
Assumed domestic sewage treatment plant flow (m3/d)	2E+03
Conditions and Measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or regional regulations.	
Conditions and measures related to external recovery of waste	
External recovery and recycling of waste should comply with applicable local and/or regional regulations.	

SECTION 3	**EXPOSURE ESTIMATION**
Section 3.1 - Health	
The ECETOC TRA tool has been used to estimate workplace exposures unless otherwise indicated.	

Section 3.2 -Environment
The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

SECTION 4	**GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO**
Section 4.1 - Health	
Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.	

Section 4.2 -Environment
Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management

measures.
Required removal efficiency for wastewater can be achieved using onsite/offsite technologies, either alone or in combination.
Required removal efficiency for air can be achieved using on-site technologies, either alone or in combination.
Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).