

SAFETY DATA SHEET

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

Piperylene 75%

| | | | |
|---------|----------------|--------------|--------------------------------|
| Version | Revision Date: | SDS Number: | Date of last issue: 28.03.2023 |
| 4.1 | 25.03.2024 | 800001007264 | Print Date 01.04.2024 |

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

1.1 Product identifier

| | |
|------------------------|-------------------------|
| Trade name | : Piperylene 75% |
| Product code | : X2163 |
| Registration number EU | : 01-2119480194-38-0000 |
| CAS-No. | : 68477-35-0 |

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

| | |
|-----------------------------------|--|
| Use of the Sub- stance/Mixture | : Base chemical., Raw material for use in the chemical industry. Please refer to section 16 and/or the annexes for the registered uses under REACH. |
| Uses advised against | : This product must not be used in applications other than the above 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)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

| | |
|------------------------------------|---|
| Flammable liquids, Category 2 | H225: Highly flammable liquid and vapour. |
| Acute toxicity, Category 4, Oral | H302: Harmful if swallowed. |
| 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. |

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|--|---|
| Aspiration hazard, Category 1 | H304: May be fatal if swallowed and enters airways. |
| Germ cell mutagenicity, Category 2 | H341: Suspected of causing genetic defects. |
| Carcinogenicity, Category 1B | H350: May cause cancer. |
| Specific target organ toxicity - single exposure, Category 3 | H335: May cause respiratory irritation. H336: May cause drowsiness or dizziness. |
| 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:

H225 Highly flammable liquid and vapour.

HEALTH HAZARDS:

H302 Harmful if swallowed.

H312 Harmful in contact with skin.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H304 May be fatal if swallowed and enters airways.

H341 Suspected of causing genetic defects.

H350 May cause cancer.

H335 May cause respiratory irritation.

H336 May cause drowsiness or dizziness.

ENVIRONMENTAL HAZARDS:

H411 Toxic to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**

P202 Do not handle until all safety precautions have been read and understood.

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

P243 Take action to prevent static discharges.

P273 Avoid release to the environment.

Response:

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

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P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/ doctor.

Storage:

No precautionary phrases.

Disposal:

No precautionary phrases.

2.3 Other hazards

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

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.

Highly flammable.

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.

Highly reactive.

May form explosive peroxides.

Will float and can be reignited on surface water.

Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger.

May form flammable/explosive vapour-air mixture.

SECTION 3: Composition/information on ingredients

3.1 Substances

Components

| Chemical name | CAS-No. EC-No. | Concentration (% w/w) |
|--|-------------------------|-----------------------|
| Distillates (petroleum), C3-6, piperylene-rich | 68477-35-0 270-726-2 | <= 100 |

Further information

Contains:

| Chemical name | Identification number | Classification | Concentration (% w/w) |
|-----------------|-----------------------|-------------------|-----------------------|
| penta-1,3-diene | 504-60-9, 207-995-2 | Flam. Liq.2; H225 | 50 - 70 |

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| Cyclopentene | 142-29-0, 205-532-9 | Flam. Liq.2; H225 Acute Tox.4; H302 Acute Tox.4; H312 Skin Irrit.2; H315 Asp. Tox.1; H304 | 20 - 30 |
| 2-Methyl-2-butene | 513-35-9, 208-156-3 | Flam. Liq.1; H224 Acute Tox.4; H302 Skin Irrit.2; H315 Muta.2; H341 Carc.2; H351 STOT SE3; H336 Asp. Tox.1; H304 Aquatic Acute2; H411 | 5 - 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 | 0.1 - < 1.5 |
| Dicyclopentadiene | 77-73-6, 201-052-9 | Flam. Liq.2; H225 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 | 0.1 - < 1.5 |
| Isoprene | 78-79-5, 201-143-3 | Flam. Liq.1; H224 Muta.2; H341 Carc.1B; H350 Aquatic Chronic2; H411 | 0.1 - < 1 |
| Other C5 Hydrocarbons | | | 1 - 5 |
| 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 |
| TBP (tert-butylphenol) - | 27178-34-3, 248-300-2 | Acute Tox.4; H302 Acute Tox.4; H312 | <= 0.01 |

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| inhibitor | | Acute Tox.4; H332 Skin Corr.1B; H314 Aquatic Chronic2; H411 | |
|-----------|--|---|--|

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 needed, 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.

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, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.

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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.

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.

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 fire-fighting : 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.

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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.

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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 | : <ul style="list-style-type: none">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 | : <ul style="list-style-type: none">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. |

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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

- | | |
|--|---|
| 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 |
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SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

| Components | CAS-No. | Value type (Form of exposure) | Control parameters | Basis |
|-------------------|--|-------------------------------|-----------------------|--|
| 2-Methyl-2-butene | 513-35-9 | TWA | 10 ppm | ACGIH |
| cyclopentadiene | 542-92-7 | TWA | 0.5 ppm | ACGIH |
| cyclopentadiene | | STEL | 1 ppm | ACGIH |
| Dicyclopentadiene | 77-73-6 | TWA | 5 ppm 27 mg/m3 | GB EH40 |
| Dicyclopentadiene | | TWA | 0.5 ppm | ACGIH |
| Dicyclopentadiene | | STEL | 1 ppm | ACGIH |
| Isoprene | 78-79-5 | TWA | 3 ppm 8.4 mg/m3 | Shell Internal Standard (SIS) for 8 hour TWA. |
| Benzene | 71-43-2 | TWA | 1 ppm 3.25 mg/m3 | GB EH40 |
| | Further information: Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity., Capable of causing cancer and/or heritable genetic damage. | | | |
| 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) |
| Benzene | | TWA | 0.5 ppm | ACGIH |
| Benzene | | STEL | 2.5 ppm | ACGIH |

Biological occupational exposure limits

| Substance name | CAS-No. | Control parameters | Sampling time | Basis |
|----------------|---------|--|--|-----------|
| Benzene | 71-43-2 | S-Phenylmercapturic acid: 25 µg/g creatinine (Urine) | End of shift (As soon as possible after exposure ceases) | ACGIH BEI |
| | | t,t-Muconic acid: 500 µg/g creatinine (Urine) | End of shift (As soon as possible after exposure ceases) | ACGIH BEI |

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

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| Substance name | End Use | Exposure routes | Potential health effects | Value |
|----------------------------|-----------|-----------------|----------------------------|-----------------------|
| Piperylene 75%, 68477-35-0 | Workers | Dermal | Long-term systemic effects | 0.34 mg/kg bw/day |
| Piperylene 75%, 68477-35-0 | Workers | Inhalation | Long-term systemic effects | 8.4 mg/m ³ |
| Piperylene 75%, 68477-35-0 | Consumers | Oral | Long-term systemic effects | 0.1 mg/kg/day |

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.

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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

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

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|--|--------------------------------|
| 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 | : 42 °C |
| Flammability | |
| Flammability (solid, gas) | : Data not available |
| Lower explosion limit and upper explosion limit / flammability limit | |
| Upper explosion limit / upper flammability limit | : 8.3 %(V) |
| Lower explosion limit / Lower flammability limit | : 1 %(V) |
| Flash point | : -29 °C |
| Auto-ignition temperature | : not determined |
| Decomposition temperature | |
| Decomposition temperature | : Data not available |
| pH | : Not applicable |
| Viscosity | |
| Viscosity, dynamic | : Data not available |
| Viscosity, kinematic | : Data not available |
| Solubility(ies) | |
| Water solubility | : insoluble |
| Solubility in other solvents | : Data not available |
| Partition coefficient: n-octanol/water | : log Pow: 2.2 - 5 |

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|---|---|---|
| Vapour pressure | : | 45 kPa (20 °C) |
| Relative density | : | 0.7 (60.0 °F) Method: ASTM D4052 |
| Density | : | Typical 725 kg/m ³ (20 °C) Method: ASTM D4052 |
| Relative vapour density | : | 2.35 |
| Particle characteristics Particle size | : | Data not available |

9.2 Other information

| | | |
|----------------------|---|------------------------------|
| Explosive properties | : | no data available |
| Oxidizing properties | : | Data not available |
| Evaporation rate | : | not determined |
| 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 |
|-----------------|---|--------------------|

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 inhibited. |
|---------------------|---|---|

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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

Acute toxicity

Product:

Acute oral toxicity : LD 50 (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 : 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.

Components:

Distillates (petroleum), C3-6, piperylene-rich:

Acute oral toxicity : LD 50 (Rat, male and female): > 300 - 2,000 mg/kg

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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 : OECD Test Guideline 404
Remarks : Causes skin irritation.

Components:

Distillates (petroleum), C3-6, piperylene-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:

Distillates (petroleum), C3-6, piperylene-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.

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Components:

Distillates (petroleum), C3-6, piperylene-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. Contains Isoprene, CAS # 78-79-5. Mutagenic; positive in in-vivo and in-vitro assays. |
|-----------------------|---|--|

Method: Literature data
Remarks: Suspected of causing genetic defects.
Contains Isoprene, CAS # 78-79-5.
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. Contains Isoprene, CAS # 78-79-5. Mutagenic; positive in in-vivo and in-vitro assays. |
|----------------------|---|---|

Species: Mouse
Method: Test(s) equivalent or similar to OECD Test Guideline 474
Remarks: Suspected of causing genetic defects.
Contains Isoprene, CAS # 78-79-5.
Mutagenic; positive in in-vivo and in-vitro assays.

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

Components:

Distillates (petroleum), C3-6, piperylene-rich:

| | | |
|-----------------------|---|--|
| Genotoxicity in vitro | : | Method: Test(s) equivalent or similar to OECD Test Guideline 473 Remarks: Suspected of causing genetic defects. Contains Isoprene, CAS # 78-79-5. Mutagenic; positive in in-vivo and in-vitro assays. |
|-----------------------|---|--|

Method: Literature data
Remarks: Suspected of causing genetic defects.
Contains Isoprene, CAS # 78-79-5.
Mutagenic; positive in in-vivo and in-vitro assays.

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| | |
|------------------------------------|--|
| Genotoxicity in vivo | : Species: Mouse Method: OECD Test Guideline 474 Remarks: Suspected of causing genetic defects. Contains Isoprene, CAS # 78-79-5. Mutagenic; positive in in-vivo and in-vitro assays. |
| | Species: Mouse Method: Test(s) equivalent or similar to OECD Test Guideline 474 Remarks: Suspected of causing genetic defects. Contains Isoprene, CAS # 78-79-5. Mutagenic; positive in in-vivo and in-vitro 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. |
| Test substance | : Isoprene |
| Remarks | : May cause cancer. Contains Isoprene, CAS # 78-79-5. Causes cancer in laboratory animals. |
| Species | : Rat, male and female |
| Application Route | : Inhalation |
| Method | : Test(s) equivalent or similar to OECD Test Guideline 453 |
| Test substance | : Isoprene |
| Remarks | : May cause cancer. Contains Isoprene, CAS # 78-79-5. Causes cancer in laboratory animals. |
| Carcinogenicity - Assessment | : May cause cancer. |

Components:

Distillates (petroleum), C3-6, piperylene-rich:

| | |
|-------------------|--|
| Species | : Mouse, male and female |
| Application Route | : Inhalation |
| Method | : Other guideline method. |
| Test substance | : Isoprene |
| Remarks | : May cause cancer. Contains Isoprene, CAS # 78-79-5. Causes cancer in laboratory animals. |
| Species | : Rat, male and female |
| Application Route | : Inhalation |

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Method : Test(s) equivalent or similar to OECD Test Guideline 453
Test substance : Isoprene
Remarks : May cause cancer.
Contains Isoprene, CAS # 78-79-5.
Causes cancer in laboratory animals.

Carcinogenicity - Assessment : May cause cancer.

| Material | GHS/CLP Carcinogenicity Classification |
|--|--|
| Distillates (petroleum), C3-6, piperylene-rich | Carcinogenicity Category 1B |
| penta-1,3-diene | No carcinogenicity classification. |
| Cyclopentene | No carcinogenicity classification. |
| 2-Methyl-2-butene | Carcinogenicity Category 2 |
| cyclopentadiene | No carcinogenicity classification. |
| Dicyclopentadiene | No carcinogenicity classification. |
| Isoprene | Carcinogenicity Category 1B |
| Other C5 Hydrocarbons | No carcinogenicity classification. |
| Benzene | Carcinogenicity Category 1A |
| TBP (tert-butylphenol) - inhibitor | No carcinogenicity classification. |

| Material | Other Carcinogenicity Classification |
|----------|---|
| Isoprene | IARC: Group 2B: Possibly carcinogenic to humans |
| Benzene | IARC: Group 1: Carcinogenic to humans |

Reproductive toxicity

Product:

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.

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Components:

Distillates (petroleum), C3-6, piperylene-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 | : | May cause drowsiness or dizziness. May cause respiratory irritation. Inhalation of vapours or mists may cause irritation to the respiratory system. High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea. |

Components:

Distillates (petroleum), C3-6, piperylene-rich:

| | | |
|-----------------|---|--|
| Exposure routes | : | Inhalation |
| Target Organs | : | Central nervous system, Respiratory Tract |
| Remarks | : | May cause drowsiness or dizziness. May cause respiratory irritation. Inhalation of vapours or mists may cause irritation to the respiratory system. 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:

Distillates (petroleum), C3-6, piperylene-rich:

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

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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 |
| Test atmosphere | : | vapour |
| Method | : | Test(s) equivalent or similar to OECD Test Guideline 422 |
| Target Organs | : | No specific target organs noted |

Components:

Distillates (petroleum), C3-6, piperylene-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:

Distillates (petroleum), C3-6, piperylene-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. |
|------------|---|---|

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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:

Distillates (petroleum), C3-6, piperylene-rich:

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

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish : LL50 (Oncorhynchus mykiss (rainbow trout)): 14.1 mg/l
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
LC/EC/IC50 >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 fish (Chronic toxicity) : Remarks: Data not available

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : Remarks: Data not available

Toxicity to microorganisms : NOELR (Activated sludge, domestic waste): 2 mg/l
Exposure time: 5 Days
Method: OECD Test Guideline 301D
Remarks: Data not available

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Components:

Distillates (petroleum), C3-6, piperylene-rich:

- | | | |
|--|---|---|
| Toxicity to fish | : | LL50 (Oncorhynchus mykiss (rainbow trout)): 14.1 mg/l 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 LC/EC/IC50 >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 Days 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

Product:

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

Components:

Distillates (petroleum), C3-6, piperylene-rich:

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

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12.3 Bioaccumulative potential

Product:

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.

Components:

Distillates (petroleum), C3-6, piperylene-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

Product:

Mobility : Remarks: Floats on water.

Components:

Distillates (petroleum), C3-6, piperylene-rich:

Mobility : Remarks: Floats on water.

12.5 Results of PBT and vPvB assessment

Product:

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

Components:

Distillates (petroleum), C3-6, piperylene-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.

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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

| | | |
|------|---|------|
| ADR | : | 1268 |
| RID | : | 1268 |
| IMDG | : | 1268 |
| IATA | : | 1268 |

14.2 UN proper shipping name

| | | |
|------|---|---|
| ADR | : | PETROLEUM DISTILLATES, N.O.S. |
| RID | : | PETROLEUM DISTILLATES, N.O.S. |
| IMDG | : | PETROLEUM DISTILLATES, N.O.S. (distillates (petroleum), C3-6, piperylene-rich) |
| IATA | : | Petroleum distillates, n.o.s. |

14.3 Transport hazard class(es)

| | | |
|-----|---|---|
| ADR | : | 3 |
|-----|---|---|

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RID : 3

IMDG : 3

IATA : 3

14.4 Packing group

ADR

Packing group : II

Classification Code : F1

Hazard Identification Number : 33

Labels : 3

RID

Packing group : II

Classification Code : F1

Hazard Identification Number : 33

Labels : 3

Remarks : SP640CD: Special provision 640D

IMDG

Packing group : II

Labels : 3

IATA

Packing group : II

Labels : 3

14.5 Environmental hazards

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 : 1-3 Pentadiene (greater than 50%), cyclopentene, and isomers, mixtures

Additional Information : This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen enriched atmospheres displaces available oxygen which may cause asphyxiation or death. Personnel must observe

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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

Other regulations:

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

Environmental Protection Act 1990 (as amended). Health and Safety at Work etc. Act 1974. Consumers Protection Act 1987. Pollution Prevention and Control Act 1999. Environment Act 1995. Factories Act 1961. The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment (Amendment) Regulations 2011. Chemicals (Hazard Information and Packaging for Supply) Regulations 2009. Control of Substances Hazardous to Health Regulations 2002 (as amended). Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations 1997. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (as amended). Personal Protective Equipment Regulations 2002. Personal Protective Equipment at Work Regulations 1992. Hazardous Waste (England and Wales) Regulations 2005(as amended). Control of Major Accident Hazards Regulations 1999 (as amended). Renewable Transport Fuel Obligations Order 2007 (as amended). Energy Act 2011. Environmental Permitting (England and Wales) Regulations 2010 (as amended). Waste (England and Wales) Regulations 2011 (as amended). Planning (Hazardous Substances) Act 1990 and associated regulations. The Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011.

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

| | |
|--------|----------|
| TSCA | : Listed |
| DSL | : Listed |
| AIIC | : Listed |
| EINECS | : Listed |
| KECI | : Listed |
| TCSI | : Listed |

15.2 Chemical safety assessment

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

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SECTION 16: Other information

Full text of other abbreviations

| | | |
|---------------|---|--|
| ACGIH | : | USA. ACGIH Threshold Limit Values (TLV) |
| ACGIH BEI | : | ACGIH - Biological Exposure Indices (BEI) |
| GB EH40 | : | UK. EH40 WEL - Workplace Exposure Limits |
| ACGIH / TWA | : | 8-hour, time-weighted average |
| ACGIH / STEL | : | Short-term exposure limit |
| GB EH40 / TWA | : | Long-term exposure limit (8-hour TWA reference period) |

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 consid- |

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ered to be PBT or vPvB.

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

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).

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 : 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.

GB / EN

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Exposure Scenario - Worker

300000000346

| SECTION 1 | EXPOSURE SCENARIO TITLE |
|------------------|---|
| Title | Manufacture of substance- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 15 Environmental Release Categories: ERC1, ERC4, 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 |

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| | |
|--|---|
| | 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 extraction ventilation at points where emissions occur. 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 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 AX 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. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Section 2.2 | Control of Environmental Exposure |

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| | |
|---|---------|
| 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): | 5.0E+04 |
| Fraction of Regional tonnage used locally: | 1 |
| Annual site tonnage (tonnes/year): | 5.0E+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 re-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. | |

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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.
Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.
Risk Management Measures are based on qualitative risk characterisation.
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>).

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 300000000349 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use as an intermediate- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC 1, PROC 2, PROC 3, PROC 4, 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 | |

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| | |
|--|---|
| | 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 | 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. |
| 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 AX 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. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Section 2.2 | Control of Environmental Exposure |

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| | |
|---|---------|
| 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): | 2.0E+04 |
| Fraction of Regional tonnage used locally: | 0.75 |
| Annual site tonnage (tonnes/year): | 1.5E+04 |
| Maximum daily site tonnage (kg/day): | 5.0E+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): | 3.0E-03 |
| Release fraction to soil from process (initial release prior to RMM): | 1.0E-03 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process re-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) | 1.0E+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. | |

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| 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. Available hazard data do not enable the derivation of a DNEL for dermal irritant effects. Risk Management Measures are based on qualitative risk characterisation. 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). | |

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 300000000348 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Distribution of substance- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC 1, PROC 2, PROC 3, PROC 8a, PROC 8b, PROC 9, PROC 15 Environmental Release Categories: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC 6C,, 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 use at not more than 20°C above ambient temperature (unless stated differently). 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 | | Avoid direct skin contact with product. Identify potential areas |

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| irritants). | 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 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 extraction ventilation at points where emissions occur. 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 4 hours |
| Process sampling | 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. |
| 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. Wear a respirator conforming to EN140 with Type AX 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. |

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| | |
|---|--|
| | 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): | 5.0E+04 |
| Fraction of Regional tonnage used locally: | 2.0E-03 |
| Annual site tonnage (tonnes/year): | 1.0E+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): | 1.0E-03 |
| Release fraction to wastewater from process (initial release prior to RMM): | 1.0E-05 |
| Release fraction to soil from process (initial release prior to RMM): | 1.0E-05 |
| Technical conditions and measures at process level (source) to prevent release | |
| Common practices vary across sites thus conservative process re-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. | |
| Prevent discharge of undissolved substance to or recover from onsite wastewater. | |
| 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 |

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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.
Available hazard data do not enable the derivation of a DNEL for dermal irritant effects.
Risk Management Measures are based on qualitative risk characterisation.
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>).

SAFETY DATA SHEET

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

Piperylene 75%

Version 4.1 Revision Date: 25.03.2024 SDS Number: 800001007264 Date of last issue: 28.03.2023
Print Date 01.04.2024

Exposure Scenario - Worker

| | |
|-------------------------|---|
| 300000000351 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Polymer production- Industrial |
| Use Descriptor | Sector of Use: SU3, SU10 Process Categories: PROC 1, PROC 2, PROC 3, PROC 4, PROC 5, PROC 6, PROC 8a, PROC 8b, PROC 14, PROC 15 Environmental Release Categories: ERC6a, ERC 6C, 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). |

| 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- | |

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| | 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)Continuous processno sampling | Handle substance within a closed system. |
| Bulk transferswith 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). |
| Polymerisation (bulk and batch)Continuous processwith 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). |
| Polymerisation (bulk and batch)Batch processwith 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). Avoid carrying out activities involving exposure for more than 4 hours |
| Finishing operationsBatch processwith sample collection | Limit the substance content in the product to 5 %. Provide extraction ventilation at points where emissions occur. |
| 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. |
| Addition and stabilisation | Limit the substance content in the product to 5 %. Provide extraction ventilation at points where emissions occur. |
| Mixing in containers.Batch process | Limit the substance content in the product to 5 %. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Provide extraction ventilation at points where emissions occur. |
| Extrusion and masterbatching | Limit the substance content in the product to 5 %. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour). Provide extraction ventilation at points where emissions occur. |
| Pelletizing | Limit the substance content in the product to 5 %. Provide a good standard of general or controlled ventilation (5 |

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| | to 15 air changes per hour). Ensure material transfers are under containment or extract ventilation. |
| Pelletisation and pellet screening(open systems) | Limit the substance content in the product to 5 %. Ensure material transfers are under containment or extract ventilation. |
| Bulk transfersContinuous processwith sample collection | Limit the substance content in the product to 5 %. Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to material transfer points and other openings. |
| Equipment maintenance | Drain down and flush system prior to equipment opening or maintenance. Clear spills immediately. Wear a respirator conforming to EN140 with Type AX 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. Provide extraction ventilation at points where emissions occur. 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): | 2.0E+04 |
| Fraction of Regional tonnage used locally: | 0.75 |
| Annual site tonnage (tonnes/year): | 1.5E+04 |
| Maximum daily site tonnage (kg/day): | 5.0E+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): | 1.0E-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 re- | |

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| lease 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 secondary wastewater treatment required. | |
| Treat air emission to provide a typical removal efficiency of (%) | 80.0 |
| 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) | 1.0E+05 |
| 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. | |

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| SECTION 3 | EXPOSURE ESTIMATION |
| Section 3.1 - Health | |
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| Section 3.2 -Environment | |
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