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# Dicyclopentadiene 94%

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

#### 1.1 Product identifier

Trade name : Dicyclopentadiene 94%

Product code X2340

Registration number EU : 01-2119463601-44-0000, 01-2119463601-44-0001

: 3a,4,7,7a-Tetrahydro-4,7-methanoindene, DCPD, Tricyclo-Synonyms

(5,2,1,0)-3,8-decadiene

CAS-No. : 77-73-6

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

Use of the Sub-: Base chemical., Use only as a chemical intermediate. stance/Mixture

Please refer to section 16 and/or the annexes for the regis-

tered uses under REACH.

: This product must not be used in applications other than the Uses advised against

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

: +31 (0)10 441 5137 / +31 (0)10 441 5191 Telephone : +31 (0)20 716 8316 / +31 (0)20 713 9230 Telefax

Contact for Safety Data : sccmsds@shell.com

Sheet

#### 1.4 Emergency telephone number

SHELL +44 (0) 1235 239 670 (This telephone number is available 24 hours per day, 7 days per week)

Poison Centers (CAV) eligible for access to information for health emergency response: CAV Osp. Bambin Gesù Roma 06 68593726; CAV Policlinico "Umberto I" Roma 06-

CAV Policlinico "A. Gemelli" Roma 06 3054343; CAV Milano 02 66101029; CAV Bergamo 800883300:

CAV Pavia 0382 24444; CAV Verona 800011858; CAV Firenze 055 7947819; CAV Napoli 081 5453333;

CAV Foggia 800183459.

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#### **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.

Aspiration hazard, Category 1 H304: May be fatal if swallowed and enters air-

ways.

Acute toxicity, Category 2, Inhalation H330: Fatal if inhaled.

Skin irritation, Category 2 H315: Causes skin irritation.

Eye irritation, Category 2 H319: Causes serious eye irritation.

Specific target organ toxicity - single ex-

posure, Category 3

H335: May cause respiratory irritation.

Reproductive toxicity, Category 2 H361: Suspected of damaging fertility or the un-

born child.

Specific target organ toxicity - repeated

exposure, Category 2

H373: May cause damage to organs through pro-

longed or repeated exposure.

Short-term (acute) aquatic hazard, Cate-

gory 1

H400: Very toxic to aquatic life.

Long-term (chronic) aquatic hazard, Cat-

egory 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.

H304 May be fatal if swallowed and enters airways.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H330 Fatal if inhaled.

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> H335 May cause respiratory irritation.

H361 Suspected of damaging fertility or the unborn child. May cause damage to organs through prolonged or H373

repeated exposure.

**ENVIRONMENTAL HAZARDS:** 

H400 Very toxic to aquatic life.

H411 Toxic to aquatic life with long lasting effects.

#### **Prevention:** Precautionary statements

P201 Obtain special instructions before use.

P210 Keep away from heat, hot surfaces, sparks, open

flames and other ignition sources. No smoking.

P240 Ground/bond container and receiving equipment.

P241 Use explosion-proof electrical/ ventilating/ lighting equipment.

P242 Use only non-sparking tools.

Take action to prevent static discharges. P243

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.

P264 Wash skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P273 Avoid release to the environment.

P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

P284 [In case of inadequate ventilation] wear respiratory protection.

#### Response:

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

Do NOT induce vomiting.

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

P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P310 Immediately call a POISON CENTER/doctor.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337 + P313 If eye irritation persists: Get medical advice/ attention.

P308 + P313 IF exposed or concerned: Get medical advice/ attention.

P362 + P364 Take off contaminated clothing and wash it before reuse.

P391 Collect spillage.

#### Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.

P235 Keep cool.

### Disposal:

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P501 Dispose of contents/ container to an approved waste disposal plant.

#### 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.

May form explosive peroxides.

May form flammable/explosive vapour-air mixture.

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

Will float and can be reignited on surface water.

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 airvapour mixtures can occur.

# **SECTION 3: Composition/information on ingredients**

#### 3.1 Substances

#### Components

| Chemical name     | CAS-No.   | Concentration (% w/w) |
|-------------------|-----------|-----------------------|
|                   | EC-No.    |                       |
| Dicyclopentadiene | 77-73-6   | >= 94                 |
|                   | 201-052-9 |                       |

Contains stabiliser.

# **SECTION 4: First aid measures**

# 4.1 Description of first aid measures

General advice : DO NOT DELAY.

Keep victim calm. Obtain medical treatment immediately.

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 : Call emergency number for your location / facility.

Remove to fresh air. Do not attempt to rescue the victim un-

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less proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardio-Pulmonary Resuscitation as required and transport to the nearest medical facility.

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 treat-

ment.

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.

Rinse mouth.

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.

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.

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.

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

Treatment : IMMEDIATE TREATMENT IS EXTREMELY IMPORTANT!

Artificial respiration and/or oxygen may be necessary. 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 diox-

ide, 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 meth-

ods

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:

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Avoid contact with skin, eyes and clothing.

Isolate hazard area and deny entry to unnecessary or unpro-

tected 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 unpro-

tected 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.

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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 ( $\leq$  1 m/s until fill pipe submerged to twice its diameter, then  $\leq$  7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or han-

dling 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

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

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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.

Storage Temperature:

Ambient.

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 regis-

tered 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

#### **Biological occupational exposure limits**

No biological limit allocated.

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

|                |         | 1               |                      | 1     |
|----------------|---------|-----------------|----------------------|-------|
| Substance name | End Use | Exposure routes | Potential health ef- | Value |
|                |         | •               | fects                |       |

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| Dicyclopentadiene | Workers                  | Inhalation | Acute local effects        | 160,23 mg/m3         |
|-------------------|--------------------------|------------|----------------------------|----------------------|
| Dicyclopentadiene | Workers                  | Dermal     | Long-term systemic effects | 0,3 mg/kg<br>bw/day  |
| Dicyclopentadiene | Workers                  | Inhalation | Long-term systemic effects | 1,058 mg/m3          |
| Dicyclopentadiene | Man via envi-<br>ronment | Inhalation | Long-term systemic effects | 0,26 mg/m3           |
| Dicyclopentadiene | Man via envi-<br>ronment | Oral       | Long-term systemic effects | 0,15 mg/kg<br>bw/day |

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

| Substance name    | Environmental Compartment | Value                           |
|-------------------|---------------------------|---------------------------------|
| Dicyclopentadiene | Fresh water               | 0,029 mg/l                      |
| Dicyclopentadiene | Sediment                  | 5,49 mg/kg                      |
| Dicyclopentadiene | Soil                      | 0,86 mg/kg dry<br>weight (d.w.) |
| Dicyclopentadiene | Sewage treatment plant    | 0,85 mg/l                       |

#### 8.2 Exposure controls

#### **Engineering measures**

Read in conjunction with the Exposure Scenario for your specific use contained in the Annex. 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:

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.

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.

Eye washes and showers for emergency use.

#### General Information:

Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Define procedures for safe handling and maintenance of controls.

Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.

Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.

Drain down system prior to equipment break-in or maintenance.

Retain drain downs in sealed storage pending disposal or subsequent recycle.

#### 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

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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. 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.

For continuous contact we recommend gloves with break-through 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.

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 resistant gloves/gauntlets and boots. Where

risk of splashing, also wear an apron.

Wear antistatic and flame-retardant clothing.

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 appa-

Where air-filtering respirators are suitable, select an appro-

priate 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 A

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boiling point > 65°C (149°F)] meeting EN14387.

## **SECTION 9: Physical and chemical properties**

9.1 Information on basic physical and chemical properties

Physical state : Pale straw-coloured liquid or yellow waxy solid.

Colour : Data not available

Odour : Camphor-like

Odour Threshold : Data not available

Melting / freezing point : Typical 10 - 15 °C

Boiling point/boiling range : Typical 170 - 190 °C (1010 hPa)

Flammability

Flammability (liquids) : Static-accumulating flammable liquid.

Lower explosion limit and upper explosion limit / flammability limit

Upper explosion limit / upper flammability limit

: 6,3 %(V)

Lower explosion limit /

Lower flammability limit

: 0,8 %(V)

•

Flash point : Typical 32 °C

Auto-ignition temperature : 503 °C

Decomposition temperature

Decomposition tempera-

Data not available

ture

pH : Not applicable

Viscosity

Viscosity, dynamic : 4 mPa.s (20 °C)

Method: ASTM D445

Viscosity, kinematic : Typical 4,5 mm2/s (20 °C)

Method: ASTM D445

Typical 2,8 mm2/s (40 °C) Method: ASTM D445

Solubility(ies)

Water solubility : 40 mg/l (22 °C)

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Partition coefficient: n-: log Pow: 3,16

octanol/water Method: Calculated value(s)

Vapour pressure 186 Pa (20 °C)

0,965 - 0,98 (30 °C) Relative density

Method: ASTM D4052

Density 965 - 980 kg/m3 (30 °C)

Method: ASTM D4052

975 - 989 kg/m3 (20 °C) Method: ASTM D4052

Relative vapour density 4,5

9.2 Other information

Not applicable **Explosives** 

Oxidizing properties Data not available

Flammability (liquids) Static-accumulating flammable liquid.

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 antistatic additives can greatly influence the conductivity of a liq-

uid

Surface tension 30 mN/m, 37,8 °C

28 mN/m, 71,1 °C

Molecular weight 132,2 g/mol

## **SECTION 10: Stability and reactivity**

#### 10.1 Reactivity

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

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#### 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 elec-

tricity.

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 may occur via inhalation, ingestion, skin absorption,

exposure skin or eye contact, and accidental ingestion.

**Acute toxicity** 

**Components:** 

Dicyclopentadiene:

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

Method: OECD Test Guideline 401 Remarks: Harmful if swallowed.

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Acute inhalation toxicity : LC 50 (Rat, male and female): > 0.5 - <= 2 mg/l

Exposure time: 6 h

Test atmosphere: vapour

Method: OECD Test Guideline 403

Remarks: Fatal if inhaled.

Acute dermal toxicity : LD 50 (Rat, male and female): > 2.000 mg/kg

Method: OECD Test Guideline 402

Remarks: Based on available data, the classification criteria

are not met.

#### Skin corrosion/irritation

#### **Components:**

# Dicyclopentadiene:

Species : Rabbit

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

#### Serious eye damage/eye irritation

## **Components:**

# Dicyclopentadiene:

Species : Rabbit

Method : OECD Test Guideline 405
Remarks : Causes serious eye irritation.

#### Respiratory or skin sensitisation

#### **Components:**

#### Dicyclopentadiene:

Species : Guinea pig

Method : OECD Test Guideline 406

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

## Germ cell mutagenicity

#### **Components:**

#### Dicyclopentadiene:

Genotoxicity in vitro : Method: OECD Test Guideline 471

Remarks: Based on available data, the classification criteria

are not met.

Method: Acceptable non-standard method.

Remarks: Based on available data, the classification criteria

are not met.

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Method: OECD Test Guideline 476

Remarks: Based on available data, the classification criteria

are not met.

Genotoxicity in vivo Species: Mouse

Method: OECD Test Guideline 474

Remarks: Based on available data, the classification criteria

are not met.

Germ cell mutagenicity- As-

sessment

This product does not meet the criteria for classification in

categories 1A/1B.

#### Carcinogenicity

#### **Components:**

Dicyclopentadiene:

Carcinogenicity - Assess-

ment

This product does not meet the criteria for classification in

categories 1A/1B.

| Material          | GHS/CLP Carcinogenicity Classification |
|-------------------|--|
| Dicyclopentadiene | No carcinogenicity classification.     |

### Reproductive toxicity

#### **Components:**

#### Dicyclopentadiene:

Effects on fertility Species: Rat

> Sex: male and female Application Route: Oral

Method: Equivalent or similar to OECD Test Guideline 416 Remarks: Suspected of damaging fertility or the unborn child.

Reproductive toxicity - As-

sessment

This product does not meet the criteria for classification in

categories 1A/1B.

## STOT - single exposure

### **Components:**

## Dicyclopentadiene:

Exposure routes Inhalation Target Organs Respiratory Tract

Remarks May cause respiratory irritation.

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#### STOT - repeated exposure

#### **Components:**

## Dicyclopentadiene:

Target Organs : Central nervous system

Assessment : The substance or mixture is classified as specific target organ

toxicant, repeated exposure, category 2.

## Repeated dose toxicity

#### **Components:**

#### Dicyclopentadiene:

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 413

Target Organs : No specific target organs noted

Species : Rat, male and female

Application Route : Oral

Method : OECD Test Guideline 408

Symptoms : Tremors

#### **Aspiration toxicity**

# **Components:**

# Dicyclopentadiene:

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 consid-

ered 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** 

**Components:** 

Dicyclopentadiene:

Remarks : Classifications by other authorities under varying regulatory

frameworks may exist.

**SECTION 12: Ecological information** 

**12.1 Toxicity** 

Components:

Dicyclopentadiene:

Toxicity to fish : LC50 (Oryzias latipes (Japanese medaka)): 15,7 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)): 0,62 mg/l

Exposure time: 48 h

Method: OECD Test Guideline 202

Remarks: Toxic

LL/EL/IL50 > 10 <= 100 mg/l

Toxicity to algae/aquatic plants : Remarks: Harmful

LL/EL/IL50 > 10 <= 100 mg/l

M-Factor (Acute aquatic tox- :

icity)

1

Toxicity to microorganisms : EC10 (Pseudomonas putida): 2,2 mg/l

Method: Other guideline method.

Remarks: Toxic

 $LL/EL/IL50 \ > 1 <= 10 \ mg/l$ 

Toxicity to fish (Chronic tox-

icity)

NOEC: 0,98 mg/l

Exposure time: 14 d Species: Lepomis macrochirus (Bluegill sunfish)

Method: Test(s) equivalent or similar to OECD Test Guideline

204

Remarks: NOEC/NOEL > 0.1 - <=1.0 mg/l

Toxicity to daphnia and other : aquatic invertebrates (Chron-

ic toxicity)

NOEC: 0,574 mg/l Exposure time: 21 d

Species: Daphnia sp. (water flea)

Method: Based on quantitative structure-activity relationship

(QSAR) modelling

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# 12.2 Persistence and degradability

#### **Components:**

Dicyclopentadiene:

Biodegradability : Biodegradation: 0 %

Exposure time: 28 d

Method: OECD Test Guideline 301F Remarks: Not readily biodegradable.

Oxidises rapidly by photo-chemical reactions in air.

### 12.3 Bioaccumulative potential

## **Components:**

Dicyclopentadiene:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

## 12.4 Mobility in soil

#### **Components:**

Dicyclopentadiene:

Mobility : Remarks: Floats on water.

#### 12.5 Results of PBT and vPvB assessment

#### **Components:**

#### Dicyclopentadiene:

Assessment : The substance does not fulfill all screening criteria for persis-

tence, bioaccumulation and toxicity and hence is not consid-

ered 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

no data available

### **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

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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.

Contaminated packaging : Packing: Emptying: Place the package upside down, and tilt

slightly, circa 10 degrees, to enable drainage in such a way that the lowest part of the package is at the exit orifice. On some packing an extra hole must be made. Drainage should be carried out at room temperature (at least 15 °C). Wait until the package is drip dry. Do not close package after draining. Please note the risks connected with emptying package and containers with flammable liquids. Emptied package should be ventilated in a safe place away from sparks and fire. Residues may be an explosion risk. Do not puncture, cut or weld in non-

cleaned package, containers or drums.

Local legislation Remarks

For the disposal of waste arising from the product, including empty containers not cleared, follow the Legislative Decree

152/06 and subsequent amendments.

#### **SECTION 14: Transport information**

14.1 UN number or ID number

ADN : 2048
ADR : 2048
RID : 2048
IMDG : 2048
IATA : 2048

14.2 UN proper shipping name

ADN : DICYCLOPENTADIENE
ADR : DICYCLOPENTADIENE
RID : DICYCLOPENTADIENE
IMDG : DICYCLOPENTADIENE

IATA : DICYCLOPENTADIENE

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14.3 Transport hazard class(es)

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

## 14.4 Packing group

ADN

Packing group : III
Classification Code : F1
Labels : 3 (N2, F)

**ADR** 

Packing group : III
Classification Code : F1
Hazard Identification Number : 30
Labels : 3

**RID** 

Packing group : III
Classification Code : F1
Hazard Identification Number : 30
Labels : 3

**IMDG** 

Packing group : III Labels : 3

**IATA** 

Packing group : III 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

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Product name : 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 enriched atmospheres displaces available oxygen which 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 - List of substances subject to authorisation

: Product is not subject to Authorisation under REACH.

(Annex XIV)

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.

H2 ACUTE TOXIC

P5c FLAMMABLE LIQUIDS

E1 ENVIRONMENTAL HAZARDS

#### Other regulations:

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

Safeguard of health and safety in the workplaces refer to D.Lgs.81/2008 and subsequent amendments.

For waste disposal refer to D.Lgs.152/2006 and subsequent amendments.

Product is subject to Decree-Law N. 105 of 26 June 2015 on the control of the danger of major accidents involving certain dangerous substances, based on Seveso III directive (2012/18/EU).

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

AIIC : Listed

DSL : Listed

IECSC : Listed

ENCS : Listed

KECI : Listed

NZIoC : Listed

PICCS : Listed

TSCA : Listed

ENCS : 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

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

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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 op-

erators.

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-

ered 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.

This product is classified as H304 (May be fatal if swallowed and enters airways). The risk relates to potential for aspiration. The risk arising from aspiration hazard is solely related to the physico-chemical properties of the substance. The risk can therefore be controlled by implementing risk management measures tailored to this specific hazard and included within Section 8 of the SDS. An exposure scenario is not presented.

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. 2 | H225 | 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. 2 | H330 | Expert judgement and weight of evidence determination. |

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|----------------|---------------------------|-----------------------------|--|
| Skin lı        | rrit. 2                   | H315                        | Expert judgement and weight of evidence determination. |
| Eye Ir         | rit. 2                    | H319                        | Expert judgement and weight of evidence determination. |
| STOT           | SE 3                      | H335                        | Expert judgement and weight of evidence determination. |
| Repr.          | 2                         | H361                        | Expert judgement and weight of evidence determination. |
| STOT           | RE 2                      | H373                        | Expert judgement and weight of evidence determination. |
| Aquat          | ic Acute 1                | H400                        | Expert judgement and weight of evidence determination. |
| Aquat          | ic 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 : 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.

IT / EN

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**Exposure Scenario - Worker** 

| Exposure Scenario - Worke | Exposure Scenario - Worker  |  |
|---------------------------|---|--|
| 30000000239               |   |  |
| 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 4, 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. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling 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 < 0.5 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 (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 measures (eye irritants).  | Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.   |
| General exposures (closed systems) | No other specific measures identified.   |
| General exposures (closed          | Ensure material transfers are under containment or extract   |

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| systems)with sample collectionGeneral measures (skin irritants).    | ventilation.  |
|---|---|
| General exposures (closed systems)Use in contained batch processes  | Ensure material transfers are under containment or extract ventilation.   |
| General exposures (open systems)Batch processwith sample collection | Handle substance within a predominantly closed system provided with extract ventilation.  Ensure material transfers are under containment or extract ventilation.  Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).  Wear suitable gloves tested to EN374.                |
| Process sampling  | Ensure material transfers are under containment or extract ventilation. Wear suitable gloves tested to EN374.   |
| Laboratory activities   | Handle in a fume cupboard or under extract ventilation. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).  |
| Bulk transfers(open systems)with potential for aerosol generation.  | Provide extraction ventilation at points where emissions occur.  Wear suitable gloves tested to EN374.  |
| Bulk transfers(closed systems)                                      | Ensure material transfers are under containment or extract ventilation. Wear suitable gloves tested to EN374.   |
| Equipment cleaning and maintenance                                  | Drain down and flush system prior to equipment opening or maintenance.  Provide extraction ventilation at points where emissions occur. , or:  Wear a respirator conforming to EN140 with Type A filter or better.  Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Storage.General measures (skin irritants).                          | Store substance within a closed system. Provide extract ventilation to material transfer points and other openings. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.   |

| Section 2.2                      | Control of Environmental Exposure |     |
|----------------------------------|-----------------------------------|-----|
| Substance is a unique structure. |                                   |     |
| Not biodegradable.               |                                   |     |
| Amounts Used                     |                                   |     |
| Fraction of EU tonnage used      | in region:                        | 0,2 |

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| 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:  | 40                |
| 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):                    | 3E-04             |
| Release fraction to soil from process (initial release prior to RMM):                          | 1E-04             |
| Technical conditions and measures at process level (source) to pr                              | revent release    |
| Common practices vary across sites thus conservative process release estimates used.           |                   |
| Technical onsite conditions and measures to reduce or limit disch                              | narges, air emis- |
| sions and releases to soil   | <b>J</b> ,        |
| Prevent discharge of undissolved substance to or recover from onsite                           |                   |
| wastewater.  |                   |
| No wastewater treatment required.  |                   |
| Risk from environmental exposure is driven by wastewater treatment                             |                   |
| plant microbes.  |                   |
| Treat air emission to provide a typical removal efficiency of (%)                              | 90                |
| Typical onsite wastewater treatment technology provides removal efficiency of (%)              | 90,9              |
| 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 p                                | olant             |
| Estimated substance removal from wastewater via domestic sewage treatment (%)                  | 90,9              |
| Total efficiency of removal from wastewater after onsite and offsite                           | 90,9              |
| (domestic treatment plant) RMMs (%)  | 6.25.04           |
| Maximum allowable site tonnage (MSafe) based on release following                              | 6,2E+04           |
| total wastewater treatment removal (kg/d)  | 2.000             |
| Assumed domestic sewage treatment plant flow (m3/d)  | 2.000             |
| Conditions and Measures related to external treatment of waste for                             | or aisposai       |
| 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 |
|-----------|---------------------|

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## Section 3.1 - Health

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

#### **Section 3.2 - Environment**

Used EUSES 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** 

| 30000000241      |  |
|------------------|--|
| SECTION 1        | EXPOSURE SCENARIO TITLE  |
| Title            | Use as an intermediate- Industrial   |
| Use Descriptor   | Sector of Use: SU3, SU10 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 (not related to Strictly Controlled Conditions). Includes 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 < 0.5 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 (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 measures (eye irritants).  | Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.   |
| General exposures (closed systems) | Wear suitable gloves tested to EN374.  |
| General exposures (closed          | Ensure material transfers are under containment or extract   |

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|   | ,   |
|---|---|
| systems)with sample collectionGeneral measures (skin irritants).    | ventilation.  |
| General exposures (closed systems)Use in contained batch processes  | Ensure material transfers are under containment or extract ventilation.   |
| General exposures (open systems)Batch processwith sample collection | Handle substance within a predominantly closed system provided with extract ventilation.  Ensure material transfers are under containment or extract ventilation.  Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).  Wear suitable gloves tested to EN374.                |
| Process sampling  | Ensure material transfers are under containment or extract ventilation. Wear suitable gloves tested to EN374.   |
| Laboratory activities   | Handle in a fume cupboard or under extract ventilation. Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour).  |
| Bulk transfers(open systems)with potential for aerosol generation.  | Provide extraction ventilation at points where emissions occur.  Wear suitable gloves tested to EN374.  |
| Bulk transfers(closed systems)                                      | Ensure material transfers are under containment or extract ventilation. Wear suitable gloves tested to EN374.   |
| Equipment cleaning and maintenance                                  | Drain down and flush system prior to equipment opening or maintenance.  Provide extraction ventilation at points where emissions occur. , or:  Wear a respirator conforming to EN140 with Type A filter or better.  Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |
| Storage.General measures (skin irritants).                          | Store substance within a closed system. Provide extract ventilation to material transfer points and other openings. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.   |

| Section 2.2                      | Control of Environmental Exposure |     |
|----------------------------------|-----------------------------------|-----|
| Substance is a unique structure. |                                   |     |
| Not biodegradable.               |                                   |     |
| Amounts Used                     |                                   |     |
| Fraction of EU tonnage used      | in region:                        | 0,1 |

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|   | 1                     |
|---|-----------------------|
| Regional use tonnage (tonnes/year):   | 1,0E+03               |
| Fraction of Regional tonnage used locally:  | 1                     |
| Annual site tonnage (tonnes/year):  | 1,0E+03               |
| Maximum daily site tonnage (kg/day):  | 3,3E+03               |
| 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):  | 2,0E-04               |
| Release fraction to wastewater from process (initial release prior to RMM):                                 | 3,0E-04               |
| Release fraction to soil from process (initial release prior to RMM):                                       | 1,0E-03               |
| Technical conditions and measures at process level (source) to pro-   |                       |
| Common practices vary across sites thus conservative process release estimates used.                        |                       |
| Technical onsite conditions and measures to reduce or limit disch   | arges, air emis-      |
| sions and releases to soil  | argoo, arronno        |
| Risk from environmental exposure is driven by soil.   |                       |
| Treat air emission to provide a typical removal efficiency of (%)   | 80                    |
| Treat onsite wastewater (prior to receiving water discharge) to provide                                     | 90,9                  |
| the required removal efficiency of >= (%)   | ,                     |
| If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.              | 0                     |
| If discharging to domestic sewage treatment plant, no secondary wastewater treatment required.              |                       |
| Prevent discharge of undissolved substance to or recover from onsite wastewater.                            |                       |
| Organisational measures to prevent/limit release from site  | <u> </u>              |
| Do not apply industrial sludge to natural soils.  |                       |
| Sludge should be incinerated, contained or reclaimed.   |                       |
| Conditions and Measures related to municipal sewage treatment p   | lant                  |
| Estimated substance removal from wastewater via domestic sewage treatment (%)                               | 90,9                  |
| Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%)    | 90,9                  |
| Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d) | 1,8E+04               |
| Assumed domestic sewage treatment plant flow (m3/d)   | 2.000                 |
| Conditions and Measures related to external treatment of waste for  |                       |
| External treatment and disposal of waste should comply with applicable regulations.                         |                       |
| Conditions and measures related to external recovery of waste   |                       |
| External recovery and recycling of waste should comply with applicable regulations.                         | local and/or regional |
|   |                       |

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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** 

Used EUSES 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**

| 30000000242      |   |
|------------------|---|
| 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 Environmental Release Categories: 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  | Product Characteristics                  |  |
| Physical form of product   | Liquid, vapour pressure < 0.5 kPa at STP |  |
| 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 (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 measures (eye irritants).                               | Use suitable eye protection. Avoid direct eye contact with product, also via contamination on hands.   |
| General exposures (closed systems)Continuous processno sampling | Wear suitable gloves tested to EN374.  |
| Bulk transferswith sample collection                            | Ensure material transfers are under containment or extract ventilation.  |

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|  | Provide a good standard of general or controlled ventilation (5  |
|--|--|
|  | to 15 air changes per hour).  Wear suitable gloves tested to EN374.  |
|  |  |
| Polymerisation (bulk and batch)Continuous process-   | Provide extraction ventilation at points where emissions occur.  |
| with sample collection                               | Wear suitable gloves tested to EN374.  |
| Polymerisation (bulk and batch)Batch processwith     | Provide extraction ventilation at points where emissions occur.  |
| sample collection                                    | Wear suitable gloves tested to EN374.  |
| Finishing operationsBatch processwith sample collec- | Provide extraction ventilation at points where emissions occur.  |
| tion   | Wear suitable gloves tested to EN374.  |
| Intermediate polymer stor-                           | Limit the substance content in the product to 5 %.  Provide extraction ventilation at points where emissions oc- |
| age  | cur.   |
|  | Wear suitable gloves tested to EN374.  |
| Additivation and stabilisa-<br>tion                  | Provide extraction ventilation at points where emissions oc-<br>cur.   |
|  | Wear suitable gloves tested to EN374.  |
| Mixing in containers.Batch process                   | Limit the substance content in the product to 5 %.  Provide extraction ventilation at points where emissions oc- |
| process  | cur.   |
|  | Wear suitable gloves tested to EN374.  |
| Extrusion and masterbatching                         | Limit the substance content in the product to 1 %.  Handle substance within a predominantly closed system pro-   |
| ing ing  | vided with extract ventilation.  |
|  | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).                      |
|  | Wear suitable gloves tested to EN374.  |
| Pelletizing  | Limit the substance content in the product to 1 %. Handle substance within a predominantly closed system pro-    |
|  | vided with extract ventilation.  |
|  | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).                      |
|  | Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.                |
| Equipment maintenance                                | Drain down and flush system prior to equipment opening or  |
|  | maintenance. Avoid carrying out activities involving exposure for more than                                      |
|  | 1 hour.  |
|  | Wear a respirator conforming to EN140 with Type A filter or better.  |
|  | Wear chemically resistant gloves (tested to EN374) in combi-   |

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|  | nation with 'basic' employee training.   |
|--|--|
| Storage.General measures (skin irritants). | Store substance within a closed system. Provide extract ventilation to material transfer points and other openings. , or: Avoid carrying out activities involving exposure for more than 1 hour. Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. |

| Section 2.2                      | Control of Environmental Exposure          |                  |
|----------------------------------|--|------------------|
| Substance is a unique structu    | ıre.                                       |                  |
| Not biodegradable.               |  |                  |
| Amounts Used                     |  |                  |
| Fraction of EU tonnage used      | in region:                                 | 0,1              |
| Regional use tonnage (tonne      | s/year):                                   | 4,0E+03          |
| Fraction of Regional tonnage     | used locally:                              | 1                |
| Annual site tonnage (tonnes/     | year):                                     | 4,0E+03          |
| Maximum daily site tonnage (     | kg/day):                                   | 1,3E+04          |
| Frequency and Duration of        | Use  |                  |
| Continuous release.              |  |                  |
| Emission Days (days/year):       |  | 300              |
|                                  | nfluenced by risk management               |                  |
| Local freshwater dilution factor | or:  | 10               |
| Local marine water dilution fa   | ctor:                                      | 100              |
|                                  | ns affecting Environmental Exposure        |                  |
| Release fraction to air from p   | rocess (initial release prior to RMM):     | 2,0E-03          |
| Release fraction to wastewate    | er from process (initial release prior to  | 3,0E-04          |
| RMM):                            |  |                  |
| •                                | process (initial release prior to RMM):    | 1,0E-04          |
|                                  | neasures at process level (source) to pr   | event release    |
|                                  | ss sites thus conservative process re-     |                  |
| lease estimates used.            |  |                  |
|                                  | s and measures to reduce or limit disch    | arges, air emis- |
| sions and releases to soil       |  |                  |
| Risk from environmental expo     |  |                  |
|                                  | wage treatment plant, no secondary         |                  |
| wastewater treatment require     |  |                  |
| <u> </u>                         | lved substance to or recover from onsite   |                  |
| wastewater.                      |  |                  |
|                                  | a typical removal efficiency of (%)        | 80               |
|                                  | r to receiving water discharge) to provide | 90,9             |
| the required removal efficience  |  |                  |
|                                  | wage treatment plant, no secondary         | 0                |
| wastewater treatment require     |  |                  |
|                                  | prevent/limit release from site            |                  |
| Do not apply industrial sludge   |  |                  |
| Sludge should be incinerated     | , contained or recialmed.                  |                  |

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| Conditions and Measures related to municipal sewage treatment plant  |         |
|--|---------|
| Estimated substance removal from wastewater via domestic sewage      | 90,9    |
| treatment (%)  |         |
| Total efficiency of removal from wastewater after onsite and offsite | 90,9    |
| (domestic treatment plant) RMMs (%)                                  |         |
| Maximum allowable site tonnage (MSafe) based on release following    | 1,7E+04 |
| total wastewater treatment removal (kg/d)                            |         |
| 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

Used EUSES 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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