

SAFETY DATA SHEET

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

Methyl Isobutyl Carbinol

| | | | |
|---------|----------------|--------------|--------------------------------|
| Version | Revision Date: | SDS Number: | Date of last issue: 07.12.2023 |
| 2.3 | 07.12.2023 | 800001005658 | Print Date 14.12.2023 |

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

1.1 Product identifier

| | |
|------------------------|--|
| Trade name | : Methyl Isobutyl Carbinol |
| Product code | : S1216 |
| Registration number EU | : 01-2119473979-13-0001 |
| Synonyms | : 1,3-dimethyl 1-butanol, 4-methylpentan-2-ol, Methyl Amyl Alcohol, MIBC |
| CAS-No. | : 108-11-2 |

| | |
|--------|-------------|
| EC-No. | : 203-551-7 |
|--------|-------------|

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

| | |
|-----------------------------------|--|
| Use of the Sub- stance/Mixture | : Solvent. 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)
Poison Centre Information (CIAV): 800 250 250

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

| | |
|---|---|
| Flammable liquids, Category 3 | H226: Flammable liquid and vapour. |
| Eye irritation, Category 2 | H319: Causes serious eye irritation. |
| Specific target organ toxicity - single ex- | H335: May cause respiratory irritation. |

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posure, Category 3, Respiratory system

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :



Signal word : Warning

Hazard statements :
PHYSICAL HAZARDS:
H226 Flammable liquid and vapour.
HEALTH HAZARDS:
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
ENVIRONMENTAL HAZARDS:
Not classified as environmental hazard according to CLP criteria.

Precautionary statements : **Prevention:**
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P370 + P378 In case of fire: Use appropriate media to extinguish.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

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.

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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.

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

SECTION 3: Composition/information on ingredients

3.1 Substances

Components

| Chemical name | CAS-No. EC-No. | Concentration (% w/w) |
|---------------------|-----------------------|-----------------------|
| 4-methylpentan-2-ol | 108-11-2 203-551-7 | 100 |

SECTION 4: First aid measures

4.1 Description of first aid measures

- General advice : In general no treatment is necessary, however, obtain medical advice.
- 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 : If swallowed, do not induce vomiting: transport to nearest

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medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. Rinse mouth.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.
Skin irritation signs and symptoms may include a burning sensation, redness, or swelling.
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.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Call a doctor or poison control center for guidance.
Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Alcohol-resistant foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media : None

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire-fighting : The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Carbon monoxide may be evolved if incomplete combustion occurs.

5.3 Advice for firefighters

Special protective equipment for firefighters : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

Specific extinguishing methods : Standard procedure for chemical fires.

Further information : Clear fire area of all non-emergency personnel.
Keep adjacent containers cool by spraying with water.

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SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Observe the 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.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Vapour may form an explosive mixture with air.
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.
Stay upwind and keep out of low areas.
6.1.2 For emergency responders:
Avoid contact with skin, eyes and clothing.
Isolate hazard area and deny entry to unnecessary or unprotected personnel.
Stay upwind and keep out of low areas.

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.
Ventilate contaminated area thoroughly.
Monitor area with combustible gas indicator.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : 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.
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.

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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.,
For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- | | |
|-------------------------|---|
| Technical measures | : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Ensure that all local regulations regarding handling and storage facilities are followed. |
| Advice on safe handling | : Avoid contact with skin, eyes and clothing. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Bulk storage tanks should be diked (bunded). Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. 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. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Do NOT use compressed air for filling, discharging, or handling operations. |
| Product Transfer | : Refer to guidance under Handling section. |

7.2 Conditions for safe storage, including any incompatibilities

- | | |
|---|--|
| Requirements for storage areas and containers | : The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Refer to section 15 for any additional specific legislation covering the packaging and storage of this product. |
| Packaging material | : Suitable material: For containers, or container linings use mild steel, stainless steel. Unsuitable material: Natural, butyl, neoprene or nitrile rubbers. |
| Container Advice | : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers. |

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7.3 Specific end use(s)

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

Ensure that all local regulations regarding handling and storage facilities are followed.
See additional references that provide safe handling practices: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

| Components | CAS-No. | Value type (Form of exposure) | Control parameters | Basis |
|---------------------|---|-------------------------------|--------------------|--------|
| 4-methylpentan-2-ol | 108-11-2 | VLE-MP | 25 ppm | PT OEL |
| | Further information: Danger for absorption by the skin, irritation of the upper respiratory tract, impairment of central nervous system, Eye irritation | | | |
| 4-methylpentan-2-ol | | VLE_CD | 40 ppm | PT OEL |
| | Further information: Danger for absorption by the skin, irritation of the upper respiratory tract, impairment of central nervous system, Eye irritation | | | |

Biological occupational exposure limits

No biological limit allocated.

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

| Substance name | End Use | Exposure routes | Potential health effects | Value |
|---------------------|-----------|-----------------|----------------------------|-------------------|
| 4-methylpentan-2-ol | Workers | Inhalation | Acute systemic effects | 208 mg/m3 |
| 4-methylpentan-2-ol | Workers | Inhalation | Acute local effects | 104 mg/m3 |
| 4-methylpentan-2-ol | Workers | Inhalation | Long-term systemic effects | 83 mg/m3 |
| 4-methylpentan-2-ol | Workers | Inhalation | Long-term local effects | 83 mg/m3 |
| 4-methylpentan-2-ol | Workers | Dermal | Long-term systemic effects | 11,8 mg/kg bw/day |
| 4-methylpentan-2-ol | Consumers | Inhalation | Acute systemic effects | 155,2 mg/m3 |
| 4-methylpentan-2-ol | Consumers | Inhalation | Acute local effects | 52,1 mg/m3 |
| 4-methylpentan-2-ol | Consumers | Inhalation | Long-term systemic effects | 14,7 mg/m3 |
| 4-methylpentan-2-ol | Consumers | Inhalation | Long-term local effects | 14,7 mg/m3 |

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| | | | | |
|---------------------|-----------|--------|----------------------------|------------------|
| 4-methylpentan-2-ol | Consumers | Dermal | Long-term systemic effects | 4,2 mg/kg bw/day |
| 4-methylpentan-2-ol | Consumers | Oral | Long-term systemic effects | 4,2 mg/kg bw/day |

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

| Substance name | Environmental Compartment | Value |
|---------------------|--|-------|
| 4-methylpentan-2-ol | | |
| Remarks: | Exposure assessments have not been presented for the environment therefore PNEC values not required. | |

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.

Firewater monitors and deluge systems are recommended.

Eye washes and showers for emergency use.

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:

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 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: Butyl rubber. Nitrile rubber. Incidental contact/Splash protection: PVC or neoprene 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 antistatic and flame-retardant clothing, if a local risk assessment deems it so.
Skin protection is not required under normal conditions of use.
For prolonged or repeated exposures use impervious clothing over parts of the body subject to exposure.
If repeated and/or prolonged skin exposure to the substance is likely, then wear suitable gloves tested to relevant Standard, and provide employee skin care programmes.
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 A boiling point > 65°C (149°F)] meeting EN14387.

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

| | |
|--|--|
| Physical state | : Liquid. |
| Colour | : clear |
| Odour | : sweet |
| Odour Threshold | : Data not available |
| Melting / freezing point | : Data not available |
| Boiling point/boiling range | : 130 - 133 °C |
| Flammability | |
| Flammability (solid, gas) | : Not applicable |
| Lower explosion limit and upper explosion limit / flammability limit | |
| Upper explosion limit / upper flammability limit | : upper flammability limit 5,5 %(V) |
| Lower explosion limit / Lower flammability limit | : Lower flammability limit 1 %(V) |
| Flash point | : 41 °C Method: IP 170 |
| Auto-ignition temperature | : 305 °C Method: ASTM E-659 |
| Decomposition temperature | |
| Decomposition temperature | : Data not available |
| pH | : Data not available |
| Viscosity | |
| Viscosity, dynamic | : 5,2 mPa.s (20 °C) Method: ASTM D445 |
| Viscosity, kinematic | : Data not available |
| Solubility(ies) | |
| Water solubility | : 16 g/l (20 °C) |
| Partition coefficient: n- | : log Pow: < 3 |

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octanol/water

Vapour pressure : 420 Pa (20 °C)

Relative density : 0,81 (20 °C)
Method: ASTM D4052

Density : 806 - 808 kg/m³ (20 °C)
Method: ASTM D4052

Relative vapour density : 3,5

Particle characteristics
Particle size : Data not available

9.2 Other information

Explosives : Not applicable

Oxidizing properties : Data not available

Evaporation rate : 0,3
Method: ASTM D 3539, nBuAc=1

Conductivity : Electrical conductivity: > 10,000 pS/m

A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid, This material is not expected to be a static accumulator.

Surface tension : 22,7 mN/m, 20 °C

Molecular weight : 102,18 g/mol

SECTION 10: Stability and reactivity

10.1 Reactivity

The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.

10.2 Chemical stability

No hazardous reaction is expected when handled and stored according to provisions

10.3 Possibility of hazardous reactions

Hazardous reactions : Reacts with strong oxidising agents.

10.4 Conditions to avoid

Conditions to avoid : Avoid heat, sparks, open flames and other ignition sources.
Prevent vapour accumulation.
In certain circumstances product can ignite due to static elec-

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tricity.

10.5 Incompatible materials

Materials to avoid : Strong oxidising agents.

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, sulphur oxides and unidentified 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 : Inhalation is the primary route of exposure although absorption may occur through skin contact or following accidental ingestion.

Acute toxicity

Product:

| | |
|---------------------------|---|
| Acute oral toxicity | : LD50 (Rat): > 2000 - <=5000 mg/kg Remarks: May be harmful if swallowed. |
| Acute inhalation toxicity | : (Rat): Remarks: Low toxicity by inhalation. No deaths at highest tested dose. |
| Acute dermal toxicity | : LD50 (Rabbit): > 2000 - <=5000 mg/kg Remarks: May be harmful in contact with skin. |

Skin corrosion/irritation

Product:

Remarks : Causes mild skin irritation.

Serious eye damage/eye irritation

Product:

Remarks : Causes serious eye irritation.

Respiratory or skin sensitisation

Product:

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

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Germ cell mutagenicity

Product:

Genotoxicity in vivo : Remarks: No evidence of mutagenic activity.

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

Carcinogenicity

Product:

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

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

| Material | GHS/CLP Carcinogenicity Classification |
|---------------------|--|
| 4-methylpentan-2-ol | No carcinogenicity classification. |

Reproductive toxicity

Product:

Effects on fertility : Remarks: Not a developmental toxicant., Based on available data, the classification criteria are not met., Does not impair fertility.

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

STOT - single exposure

Product:

Remarks : May cause respiratory irritation.

STOT - repeated exposure

Product:

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

Aspiration toxicity

Product:

Not an aspiration hazard., Based on available data, the classification criteria are not met.

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11.2 Information on other hazards

Endocrine disrupting properties

Product:

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

Further information

Product:

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

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

SECTION 12: Ecological information

12.1 Toxicity

Product:

Toxicity to fish : Remarks: Practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to daphnia and other aquatic invertebrates : Remarks: Practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to algae/aquatic plants : Remarks: Practically non toxic:
LL/EL/IL50 > 100 mg/l

Toxicity to fish (Chronic toxicity) : Remarks: Data not available

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : Remarks: NOEC/NOEL > 10 - <=100 mg/l

Toxicity to microorganisms :
Remarks: Practically non toxic:
LL/EL/IL50 > 100 mg/l

12.2 Persistence and degradability

Product:

Biodegradability : Remarks: Readily biodegradable.

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Oxidises rapidly by photo-chemical reactions in air.

12.3 Bioaccumulative potential

Product:

Bioaccumulation : Remarks: Does not bioaccumulate significantly.

12.4 Mobility in soil

Product:

Mobility : Remarks: Dissolves in 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..

12.6 Endocrine disrupting properties

Product:

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

12.7 Other adverse effects

Product:

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

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Recover or recycle if possible.
It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.
Do not dispose into the environment, in drains or in water courses.
Waste product should not be allowed to contaminate soil or ground water, or be disposed of into the environment.
Waste, spills or used product is dangerous waste.

Disposal should be in accordance with applicable regional,

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national, and local laws and regulations.

Local regulations may be more stringent than regional or national requirements and must be complied with.

MARPOL - see International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which provides technical aspects at controlling pollutions from ships.

Contaminated packaging : Drain container thoroughly.
After draining, vent in a safe place away from sparks and fire.
Residues may cause an explosion hazard.
Do not, puncture, cut, or weld uncleaned drums.
Send to drum recoverer or metal reclaimer.

Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand.

Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand.
Disposal should be in accordance with applicable regional, national, and local laws and regulations.

SECTION 14: Transport information

14.1 UN number or ID number

| | | |
|------|---|------|
| ADR | : | 2053 |
| RID | : | 2053 |
| IMDG | : | 2053 |
| IATA | : | 2053 |

14.2 UN proper shipping name

| | | |
|------|---|--------------------------|
| ADR | : | METHYL ISOBUTYL CARBINOL |
| RID | : | METHYL ISOBUTYL CARBINOL |
| IMDG | : | METHYL ISOBUTYL CARBINOL |
| IATA | : | Methyl isobutyl carbinol |

14.3 Transport hazard class(es)

| | | |
|------|---|---|
| ADR | : | 3 |
| RID | : | 3 |
| IMDG | : | 3 |
| IATA | : | 3 |

14.4 Packing group

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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

ADR

| | | |
|---------------------------|---|----|
| Environmentally hazardous | : | no |
|---------------------------|---|----|

RID

| | | |
|---------------------------|---|----|
| Environmentally hazardous | : | no |
|---------------------------|---|----|

IMDG

| | | |
|------------------|---|----|
| Marine pollutant | : | no |
|------------------|---|----|

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 | : | Z |
| Ship type | : | 3; Must be Double Hulled |
| Product name | : | Methyl amyl alcohol |

| | | |
|-------------------------------|---|---|
| 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 |
|-------------------------------|---|---|

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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 (Annex XIV) | : | Product is not subject to Authorisation under REACH. |
| REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). | : | This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57). |

| | | |
|---|-----|-------------------|
| Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances. | P5c | FLAMMABLE LIQUIDS |
|---|-----|-------------------|

Other regulations:

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

Product is subject to Decree Law No 150/2015 of 5 August 2015 that transposes Seveso III directive (2012/18/EU) into national law and establishes the system for the prevention and control of serious accidents involving dangerous substances and the limitation of their consequences for human health and the environment.

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

| | | |
|-------|---|--------|
| DSL | : | Listed |
| IECSC | : | Listed |
| ENCS | : | Listed |
| KECI | : | Listed |
| PICCS | : | Listed |
| TSCA | : | Listed |
| TCSI | : | Listed |
| NZIoC | : | 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

| | | |
|-----------------|---|--|
| PT OEL | : | Portugal. Security and Health at the Workplace - Occupational exposure limits of chemical agents |
| PT OEL / VLE-MP | : | Time Weighted Average |
| PT OEL / VLE_CD | : | Short Term Exposure Limit |

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

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

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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).

Classification of the mixture:

| | |
|--------------|------|
| Flam. Liq. 3 | H226 |
| Eye Irrit. 2 | H319 |
| STOT SE 3 | H335 |

Classification procedure:

On basis of test data.
Expert judgement and weight of evidence determination.
Expert judgement and weight of evidence determination.

Identified Uses according to the Use Descriptor System

Uses - Worker

Title : Manufacture of substance- Industrial

Uses - Worker

Title : Use as an intermediate- Industrial

Uses - Worker

Title : Distribution of substance- Industrial

Uses - Worker

Title : Formulation & (re)packing of substances and mixtures- Industrial

Uses - Worker

Title : Use in Oil and Gas field drilling and production operations- Industrial

Uses - Worker

Title : Functional Fluids- Industrial

Uses - Worker

Title : Functional Fluids- Professional

Uses - Worker

Title : Use in laboratories- Industrial

Uses - Worker

Title : Use in laboratories- Professional

Uses - Worker

Title : Mining chemicals- 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 guid-

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ance 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.

PT / EN

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Exposure Scenario - Worker

| | |
|-------------------------|---|
| 300000000384 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Manufacture of substance- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15 Environmental Release Categories: ERC1, ERC4 |
| 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 |
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |

| | |
|---|--|
| 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)PROC1PROC2PROC3 | No other specific measures identified. |
| General exposures (open systems)PROC4 | No other specific measures identified. |

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| | |
|--|--|
| Process samplingPROC8b | Avoid carrying out activities involving exposure for more than 15 minutes. |
| Laboratory activitiesPROC15 | No other specific measures identified. |
| Bulk transfers(open systems)PROC8b | No other specific measures identified. |
| Bulk transfers(closed systems)PROC8b | No other specific measures identified. |
| Equipment cleaning and maintenancePROC8a | No other specific measures identified. |
| Storage.PROC1PROC2 | Store substance within a closed system. |

Section 2.2

Control of Environmental Exposure

No exposure assessment presented for the environment.

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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 300000000385 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use as an intermediate- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC15 Environmental Release Categories: ERC1, ERC4 |
| 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 |
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |

| | |
|---|--|
| 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)PROC1PROC2PROC3 | No other specific measures identified. |
| General exposures (open systems)PROC4 | No other specific measures identified. |

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| | |
|--|--|
| Process samplingPROC8b | Avoid carrying out activities involving exposure for more than 15 minutes. |
| Laboratory activitiesPROC15 | No other specific measures identified. |
| Bulk transfers(open systems)PROC8b | No other specific measures identified. |
| Bulk transfers(closed systems)PROC8b | No other specific measures identified. |
| Equipment cleaning and maintenancePROC8a | No other specific measures identified. |
| Storage.PROC1PROC2 | Store substance within a closed system. |

Section 2.2

Control of Environmental Exposure

No exposure assessment presented for the environment.

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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

300000000386

| SECTION 1 | EXPOSURE SCENARIO TITLE |
|------------------|--|
| Title | Distribution of substance- Industrial |
| Use Descriptor | Sector of Use: SU3, SU8, SU9 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC15 Environmental Release Categories: ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7 |
| Scope of process | Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading distribution and associated laboratory activities. |

| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|---|--|
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| 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)PROC1 | No other specific measures identified. |
| General exposures.with occasional controlled expo- | No other specific measures identified. |

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| | |
|---|--|
| sure.PROC2 | |
| General exposures (closed systems)Batch processPROC3 | No other specific measures identified. |
| General exposures (open systems)PROC4 | Provide extraction ventilation at points where emissions occur. |
| Process samplingPROC3 | No other specific measures identified. |
| Laboratory activitiesPROC15 | No other specific measures identified. |
| Bulk transfers(closed systems)PROC8b | No other specific measures identified. |
| Bulk transfers(open systems)PROC8b | No other specific measures identified. |
| Drum and small package fillingPROC9 | Clear spills immediately. |
| Equipment cleaning and maintenancePROC8b | Retain drain downs in sealed storage pending disposal or for subsequent recycle. |
| Storage.PROC1PROC2 | Store substance within a closed system. |
| Section 2.2 | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | |

| | |
|---|----------------------------|
| 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 |
| No exposure assessment presented for the environment. |

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

| |
|---|
| Section 4.2 -Environment |
| No exposure assessment presented for the environment. |

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Exposure Scenario - Worker

| | |
|-------------------------|--|
| 300000000387 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Formulation & (re)packing of substances and mixtures- Industrial |
| Use Descriptor | Sector of Use: SU10 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15 Environmental Release Categories: ERC2 |
| Scope of process | Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities. |

| | |
|---|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| 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)PROC1 | No other specific measures identified. |
| General exposures (closed | No other specific measures identified. |

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| | |
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| systems)with occasional controlled exposure.PROOC2 | |
| General exposures (closed systems)Batch processPROC3 | No other specific measures identified. |
| General exposures (open systems)PROC4 | Provide extraction ventilation at points where emissions occur. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Batch processes at elevated temperaturesPROC3 | Handle substance within a closed system. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Process samplingPROC3 | No other specific measures identified. |
| Laboratory activitiesPROC15 | No other specific measures identified. |
| Bulk transfersDedicated facilityPROC8b | Clear transfer lines prior to de-coupling. Clear spills immediately. Remotely vent displaced vapours. |
| Mixing operations (open systems)PROC5 | No other specific measures identified. |
| Transfer from/pouring from containersManualPROC8a | Use drum pumps or carefully pour from container. |
| Drum/batch transfersDedicated facilityPROC8b | No other specific measures identified. |
| Production or preparation or articles by tableting, compression, extrusion or pelletisationPROC14 | No other specific measures identified. |
| Drum and small package fillingPROC9 | No other specific measures identified. |
| Equipment cleaning and maintenancePROC8a | Drain down system prior to equipment opening or maintenance. |
| Storage.PROOC1PROC2 | Store substance within a closed system. |
| Section 2.2 | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | |

| | |
|---|----------------------------|
| 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 |
|---------------------------------|

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No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

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| 300000000388 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use in Oil and Gas field drilling and production operations-Industrial |
| Use Descriptor | Sector of Use: SU3 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b Environmental Release Categories: ERC4 |
| Scope of process | Oil field well drilling and production operations (including drilling muds and well cleaning) including material transfers, on-site formulation, well head operations, shaker room activities and related maintenance. |

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| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES | |
| Additional Information | No exposure assessment presented for the environment. | |
| 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 percentage substance in the product up to 100%., | |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | | |
| 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. | |
| Bulk transfers from tote tanks and supply vesselsPROC8b | Transfer via enclosed lines. Clear transfer lines prior to de-coupling. | |
| Filling/ preparation of | Use drum pumps or carefully pour from container. | |

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| equipment from drums or containers.PROC8b | |
| Drilling mud (re-)formulationUse in contained batch processesPROC3 | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Drill floor operationsPROC4 | Ensure operation is undertaken outdoors. , or: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Operation of solids filtering equipmentelevated temperaturePROC4 | Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. |
| Cleaning of solids filtering equipmentPROC8a | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Treatment and disposal of filtered solidsPROC3 | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Process samplingPROC3 | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| General exposures (closed systems)PROC1 | No other specific measures identified. |
| Pouring from small containersPROC8a | No other specific measures identified. |
| General exposures (open systems)PROC4 | Provide extraction ventilation at points where emissions occur. Use drum pumps or carefully pour from container. |
| Equipment cleaning and maintenancePROC8a | Drain down system prior to equipment opening or maintenance. |
| Storage.PROC1PROC2 | Store substance within a closed system. |
| Section 2.2 | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | |

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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. | |

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| Section 3.2 -Environment | |
| No exposure assessment presented for the environment. | |

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| SECTION 4 | GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO |
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Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

300000000389

| SECTION 1 | EXPOSURE SCENARIO TITLE |
|------------------|---|
| Title | Functional Fluids- Industrial |
| Use Descriptor | Sector of Use: SU3 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9 Environmental Release Categories: ERC7 |
| Scope of process | Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in industrial equipment including maintenance and related material transfers. |

| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|---|---|
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| Contributing Scenarios | Risk Management Measures |

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|---|--|
| 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. |
| Bulk transfers(closed systems)PROC1PROC2PROC3 | No other specific measures identified. |
| Drum/batch transfersDedicated facilityPROC8b | No other specific measures identified. |
| Filling of articles/equipment(closed sys- | No other specific measures identified. |

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| tems)PROC9 | |
| ManualFilling/ preparation of equipment from drums or containers.PROC8a | No other specific measures identified. |
| General exposures (closed systems)PROC2 | No other specific measures identified. |
| General exposures (open systems)PROC4 | No other specific measures identified. |
| General exposures (open systems)elevated temperature-PROC4 | Provide extraction ventilation at points where emissions occur. |
| Equipment cleaning and maintenancePROC8a | No other specific measures identified. |
| Storage.PROC1PROC2 | Store substance within a closed system. |

Section 2.2

Control of Environmental Exposure

No exposure assessment presented for the environment.

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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

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| 300000000390 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Functional Fluids- Professional |
| Use Descriptor | Sector of Use: SU22 Process Categories: PROC1, PROC2, PROC3, PROC8a, PROC9, PROC20 Environmental Release Categories: ERC9a, ERC9b |
| Scope of process | Use as functional fluids e.g. cable oils, transfer oils, coolants, insulators, refrigerants, hydraulic fluids in professional equipment including maintenance and related material transfers. |

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| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| 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. |
| Drum/batch transfersPROC8a | Use drum pumps or carefully pour from container. |
| Transfer from/pouring from containersFilling/ preparation of equipment from drums or containers.PROC9 | Use drum pumps or carefully pour from container. |

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| General exposures (closed systems)PROC1PROC2PROC3 | No other specific measures identified. |
| Operation of equipment containing engine oils and similar.(closed systems)PROC20 | No other specific measures identified. |
| Operation of equipment containing engine oils and similar.(closed systems)elevated temperaturePROC20 | Provide extraction ventilation at points where emissions occur. |
| Remanufacture of reject articlesPROC9 | Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). |
| Equipment cleaning and maintenancePROC8a | Drain down system prior to equipment opening or maintenance. |
| Storage.PROC1PROC2 | Store substance within a closed system. |

Section 2.2

Control of Environmental Exposure

No exposure assessment presented for the environment.

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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

300000000391

| SECTION 1 | EXPOSURE SCENARIO TITLE |
|------------------|---|
| Title | Use in laboratories- Industrial |
| Use Descriptor | Sector of Use: SU3 Process Categories: PROC10, PROC15 Environmental Release Categories: ERC2, ERC4 |
| Scope of process | Use of the substance within laboratory settings, including material transfers and equipment cleaning. |

| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|---|--|
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| 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. |
| Laboratory activitiesPROC15 | No other specific measures identified. |
| CleaningPROC10 | No other specific measures identified. |
| Section 2.2 | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | |

| 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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

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|-------------------------|---|
| 300000000392 | |
| SECTION 1 | EXPOSURE SCENARIO TITLE |
| Title | Use in laboratories- Professional |
| Use Descriptor | Sector of Use: SU22 Process Categories: PROC10, PROC15 Environmental Release Categories: ERC8a |
| Scope of process | Use of small quantities within laboratory settings, including material transfers and equipment cleaning. |

| | | |
|--|---|--|
| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES | |
| Additional Information | No exposure assessment presented for the environment. | |
| 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 percentage substance in the product up to 100%., | |
| 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. | | |
| Assumes use at not more than 20°C above ambient temperature (unless stated differently). | | |
| 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. |
| Laboratory activitiesPROC15 | | No other specific measures identified. |
| CleaningPROC10 | | No other specific measures identified. |
| Section 2.2 | | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | | |

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| 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

No exposure assessment presented for the environment.

SECTION 4

GUIDANCE TO CHECK COMPLIANCE WITH THE EXPOSURE SCENARIO

Section 4.1 - Health

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

Section 4.2 -Environment

No exposure assessment presented for the environment.

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Exposure Scenario - Worker

300000000393

| SECTION 1 | EXPOSURE SCENARIO TITLE |
|------------------|---|
| Title | Mining chemicals- Industrial |
| Use Descriptor | Sector of Use: SU3 Process Categories: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9 Environmental Release Categories: ERC4 |
| Scope of process | Covers the use of the substance in extraction processes at mining operations, including material transfers, winning and separation activities, and substance recovery and disposal. |

| SECTION 2 | OPERATIONAL CONDITIONS AND RISK MANAGEMENT MEASURES |
|---|--|
| Additional Information | No exposure assessment presented for the environment. |
| 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 percentage substance in the product up to 100%., |
| 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. Assumes use at not more than 20°C above ambient temperature (unless stated differently). | |
| 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. |
| Bulk transfers(closed systems)PROC2 | Transfer via enclosed lines. |
| Drum/batch transfersDedicated facilityPROC8b | No other specific measures identified. |
| ManualPouring from small containersPROC9 | No other specific measures identified. |

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| General exposures (closed systems)PROC3 | No other specific measures identified. |
| General exposures (open systems)PROC5 | Restrict area of openings to equipment. |
| phase separation(open systems)PROC4 | No other specific measures identified. |
| ion exchange processes(closed systems)PROC2 | No other specific measures identified. |
| Process samplingPROC3 | No other specific measures identified. |
| Equipment cleaning and maintenancePROC8a | Drain down system prior to equipment opening or maintenance. |
| Storage.PROC1 | Store substance within a closed system. |
| Section 2.2 | Control of Environmental Exposure |
| No exposure assessment presented for the environment. | |

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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. | |

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| Section 3.2 -Environment |
| No exposure assessment presented for the environment. |

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

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| Section 4.2 -Environment |
| No exposure assessment presented for the environment. |