# SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended by Commission Regulation (EU) 2020/878

Version 7.11
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GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

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

### 1.1 Product identifiers

Product name : Toluene EMPLURA®

Product Number : 1.08323
Catalogue No. : 108323
Brand : Millipore
Index-No. : 601-021-00-3
REACH No. : 01-2119471310-51-XXXX
CAS-No. : 108-88-3

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

Identified uses : Chemical production, Solvent

### 1.3 Details of the supplier of the safety data sheet

Company : Merck KGaA
Frankfurter Str. 250
D-64271 DARMSTADT

Telephone : +49 (0)6151 72-0
Fax : +49 6151 727780
E-mail address : TechnicalService@merckgroup.com

### 1.4 Emergency telephone number

Emergency Phone # : +(44)-870-8200418 (CHEMTREC (GB))
+(353)-19014670 (CHEMTREC Ireland)
001-803-017-9114 (CHEMTREC India)

## 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. |
| Skin irritation, Category 2 | H315: Causes skin irritation. |
| Reproductive toxicity, Category 2 | H361d: Suspected of damaging the unborn child. |



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| | |
|---|---|
| Specific target organ toxicity - single exposure, Category 3, Central nervous system | H336: May cause drowsiness or dizziness. |
| Specific target organ toxicity - repeated exposure, Category 2, Central nervous system | H373: May cause damage to organs through prolonged or repeated exposure if inhaled. |
| Aspiration hazard, Category 1 | H304: May be fatal if swallowed and enters airways. |
| Long-term (chronic) aquatic hazard, Category 3 | H412: Harmful to aquatic life with long lasting effects. |

## 2.2 Label elements

**Labelling (REGULATION (EC) No 1272/2008)**

Hazard pictograms :

Signal word : Danger

Hazard statements :

| | |
|---|---|
| H225 | Highly flammable liquid and vapour. |
| H304 | May be fatal if swallowed and enters airways. |
| H315 | Causes skin irritation. |
| H336 | May cause drowsiness or dizziness. |
| H361d | Suspected of damaging the unborn child. |
| H373 | May cause damage to organs (Central nervous system) through prolonged or repeated exposure if inhaled. |
| H412 | Harmful to aquatic life with long lasting effects. |

Precautionary statements :

**Prevention:**

| | |
|---|---|
| P202 | Do not handle until all safety precautions have been read and understood. |
| P210 | Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. |
| P273 | Avoid release to the environment. |

**Response:**

| | |
|---|---|
| P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER/ doctor. |
| P303 + P361 + P353 | IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. |
| P331 | Do NOT induce vomiting. |



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**Reduced Labelling (<= 125 ml)**

Hazard pictograms :

| | |
|---|---|
| Signal word | Danger |
| Hazard Statements | |
| H304 | May be fatal if swallowed and enters airways. |
| H412 | Harmful to aquatic life with long lasting effects. |
| H361d | Suspected of damaging the unborn child. |
| Precautionary Statements | |
| P202 | Do not handle until all safety precautions have been read and understood. |
| P301 + P310 | IF SWALLOWED: Immediately call a POISON CENTER/ doctor. |
| P331 | Do NOT induce vomiting. |
| Supplemental Hazard Statements | none |

### 2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

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.

## SECTION 3: Composition/information on ingredients

### 3.1 Substances

Index-No. : 601-021-00-3

EC-No. : 203-625-9

**Components**

| Chemical name | CAS-No.<br>EC-No. | Concentration (% w/w) | M-Factor, SCL, ATE |
|---|---|---|---|
| Toluene | 108-88-3<br>203-625-9 | >= 90 - <= 100 | specific concentration limit STOT SE 3; H336 20 % |



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## SECTION 4: First aid measures

### 4.1 Description of first aid measures

| | | |
|---|---|---|
| General advice | : | Show this safety data sheet to the doctor in attendance. |
| If inhaled | : | After inhalation: fresh air. Call in physician. |
| In case of skin contact | : | In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician. |
| In case of eye contact | : | After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses. |
| If swallowed | : | After swallowing: caution if victim vomits. Risk of aspiration! Keep airways free. Pulmonary failure possible after aspiration of vomit. Call a physician immediately. |

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

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

No data available

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

| | | |
|---|---|---|
| Suitable extinguishing media | : | Foam<br>Carbon dioxide (CO2)<br>Dry powder |
| Unsuitable extinguishing media | : | For this substance/mixture no limitations of extinguishing agents are given. |

### 5.2 Special hazards arising from the substance or mixture

| | | |
|---|---|---|
| Specific hazards during fire fighting | : | Combustible.<br><br>Pay attention to flashback.<br>Vapours are heavier than air and may spread along floors.<br>Development of hazardous combustion gases or vapours possible in the event of fire.<br>Forms explosive mixtures with air at ambient temperatures. |
| Hazardous combustion | : | Carbon oxides |



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products

### 5.3 Advice for firefighters

| | | |
|---|---|---|
| Special protective equipment for fire-fighters | : | Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing. |
| Further information | : | Remove container from danger zone and cool with water.<br>Prevent fire extinguishing water from contaminating surface water or the ground water system. |

## SECTION 6: Accidental release measures

### 6.1 Personal precautions, protective equipment and emergency procedures

| | | |
|---|---|---|
| Personal precautions | : | Advice for non-emergency personnel:<br>Do not breathe vapours, aerosols.<br>Avoid substance contact.<br>Ensure adequate ventilation.<br>Keep away from heat and sources of ignition.<br>Evacuate the danger area, observe emergency procedures, consult an expert. |

For personal protection see section 8.

### 6.2 Environmental precautions

| | | |
|---|---|---|
| Environmental precautions | : | Do not let product enter drains.<br>Risk of explosion. |

### 6.3 Methods and material for containment and cleaning up

| | | |
|---|---|---|
| Methods for cleaning up | : | Cover drains. Collect, bind, and pump off spills.<br>Observe possible material restrictions (see sections 7 and 10).<br>Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area. |

### 6.4 Reference to other sections

For disposal considerations see section 13.

## SECTION 7: Handling and storage

### 7.1 Precautions for safe handling

| | | |
|---|---|---|
| Advice on safe handling | : | Work under hood. Do not inhale substance/mixture.<br>Avoid generation of vapours/aerosols. |
| Advice on protection against fire and explosion | : | Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge. |
| Hygiene measures | : | Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after |



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working with substance.

For precautions see section 2.2.

### 7.2 Conditions for safe storage, including any incompatibilities

Further information on storage conditions : Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Storage class (TRGS 510) : 3, Flammable liquids

Further information on storage stability : Recommended storage temperature see product label.

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## SECTION 8: Exposure controls/personal protection

### 8.1 Control parameters

**Occupational Exposure Limits**

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

| Substance name | End Use | Exposure routes | Potential health effects | Value |
|---|---|---|---|---|
| | Workers | Inhalation | Acute systemic effects | 384 mg/m3 |
| | Workers | Inhalation | Acute local effects | 384 mg/m3 |
| | Workers | Skin contact | Long-term systemic effects | 384 mg/kg BW/d |
| | Workers | Inhalation | Long-term systemic effects | 192 mg/m3 |
| | Workers | Inhalation | Long-term local effects | 192 mg/m3 |
| | Consumers | Inhalation | Acute systemic effects | 226 mg/m3 |
| | Consumers | Inhalation | Acute local effects | 226 mg/m3 |
| | Consumers | Skin contact | Long-term systemic effects | 226 mg/kg BW/d |
| | Consumers | Inhalation | Long-term systemic effects | 56,5 mg/m3 |
| | Consumers | Ingestion | Long-term systemic effects | 8,13 mg/kg BW/d |

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

| Substance name | Environmental Compartment | Value |
|---|---|---|
| | Soil | 2,89 mg/kg |
| | Marine water | 0,68 mg/l |
| | Fresh water | 0,68 mg/l |
| | Marine sediment | 16,39 mg/kg |



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| | | |
|---|---|---|
| | Fresh water sediment | 16,39 mg/kg |
| | Sewage treatment plant | 13,61 mg/l |
| | Aquatic intermittent release | 0,68 mg/l |

## 8.2 Exposure controls

### Personal protective equipment

Eye/face protection : Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Safety glasses

Hand protection

| | | |
|---|---|---|
| Material | : | Viton® |
| Break through time | : | 480 min |
| Glove thickness | : | 0,7 mm |
| Protective index | : | Full contact |
| Manufacturer | : | Vitoject® (KCL 890 / Aldrich Z677698, Size M) |

| | | |
|---|---|---|
| Material | : | Viton® |
| Break through time | : | 480 min |
| Glove thickness | : | 0,7 mm |
| Protective index | : | Splash contact |
| Manufacturer | : | Vitoject® (KCL 890 / Aldrich Z677698, Size M) |

Remarks : This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: www.kcl.de).

Skin and body protection : Flame retardant antistatic protective clothing.

Respiratory protection : required when vapours/aerosols are generated.
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepeneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

### Environmental exposure controls

Advice : Do not let product enter drains.
Risk of explosion.



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## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

| | | |
|---|---|---|
| Physical state | : | liquid (20 °C, 1.013 hPa) |
| Color | : | colourless |
| Odor | : | benzene-like |
| Odor Threshold | : | 0,2 ppm |
| Melting point/ range | : | -95 - -93 °C |
| Boiling point/boiling range | : | 110,6 °C (1.013 hPa) |
| Flammability | : | No data available |
| Upper explosion limit / Upper flammability limit | : | Upper explosion limit<br>7,1 %(V) |
| Lower explosion limit / Lower flammability limit | : | Lower explosion limit<br>1,2 %(V) |
| Flash point | : | 4,4 °C(1.013 hPa)<br>Method: closed cup, closed cup |
| Autoignition temperature | : | 480 °C (1.013,25 hPa) |
| Decomposition temperature | : | No data available |
| pH | : | Not applicable |
| Viscosity | | |
| Viscosity, dynamic | : | 0,56 mPa.s (25 °C) |
| Viscosity, kinematic | : | No data available |
| Flow time | : | No data available |
| Solubility(ies) | | |
| Water solubility | : | 0,58 g/l (25 °C)<br>pH: 7 |



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| | | |
|---|---|---|
| | | partly soluble |
| Partition coefficient: n-octanol/water | : | log Pow: 2,73 (20 °C)<br>pH: 7<br>Bioaccumulation is not expected. |
| Vapor pressure | : | 30,88 hPa (21,1 °C) |
| Relative density | : | No data available |
| Density | : | 0,87 g/cm3 (20 °C) |
| Relative vapour density | : | 3,18 |

### 9.2 Other information

| | | |
|---|---|---|
| Explosives | : | Not classified as explosive. |
| Oxidizing properties | : | none |
| Burning rate | : | No data available |
| Evaporation rate | : | No data available |
| Conductivity | : | < 0,01 µS/cm |
| Surface tension | : | 27,73 mN/m, 0,516 g/l, 25 °C |
| Molecular weight | : | 92,14 g/mol |

## SECTION 10: Stability and reactivity

### 10.1 Reactivity

Vapours may form explosive mixture with air.

### 10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .

### 10.3 Possibility of hazardous reactions

| | | |
|---|---|---|
| Hazardous reactions | : | Risk of explosion with:<br><br>fuming sulfuric acid |



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Nitric acid
silver
perchlorates
nitrogen dioxide
nonmetallic halides
halogen-halogen compounds
uranium hexafluoride
organic nitro compounds
Violent reactions possible with:

Strong acids
Strong oxidizing agents
sulfur
with
Heat

### 10.4 Conditions to avoid

Conditions to avoid : Warming.

### 10.5 Incompatible materials

No data available

### 10.6 Hazardous decomposition products

In the event of fire: see section 5

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

**Acute toxicity**
LD50 Oral - Rat - male - 5.580 mg/kg
(Directive 67/548/EEC, Annex V, B.1.)
LC50 Inhalation - Rat - male - 4 h - 25,7 mg/l - vapour

(OECD Test Guideline 403)
LD50 Dermal - Rabbit - male - > 5.000 mg/kg
Remarks: (ECHA)

**Skin corrosion/irritation**
Skin - Rabbit
Result: irritating - 4 h
(Regulation (EC) No. 440/2008, Annex, B.4)

**Serious eye damage/eye irritation**
Eyes - Rabbit
Result: No eye irritation
(OECD Test Guideline 405)

**Respiratory or skin sensitization**
Maximisation Test - Guinea pig
Result: negative
(Regulation (EC) No. 440/2008, Annex, B.6)

**Germ cell mutagenicity**
Test Type: In vitro mammalian cell gene mutation test
Test system: Mouse lymphoma test



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Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative
Test Type: Ames test
Test system: S. typhimurium
Metabolic activation: with and without metabolic activation
Method: Regulation (EC) No. 440/2008, Annex, B.13/14 (Ames test)
Result: negative

Test Type: Chromosome aberration test
Species: Rat
Cell type: Bone marrow
Application Route: Intraperitoneal

Result: negative
Remarks: (ECHA)

**Carcinogenicity**
No data available

**Reproductive toxicity**
Suspected of damaging the unborn child.

**Specific target organ toxicity - single exposure**
Inhalation - May cause drowsiness or dizziness. - Central nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Specific target organ toxicity - repeated exposure**
Inhalation - May cause damage to organs through prolonged or repeated exposure.
- Central nervous system
Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

**Aspiration hazard**
Aspiration may cause pulmonary oedema and pneumonitis.

### 11.2 Additional Information

**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. |

Repeated dose toxicity - Rat - male and female - Oral - 13 Weeks - No observed adverse effect level - 625 mg/kg - Lowest observed adverse effect level - 1.250 mg/kg

## SECTION 12: Ecological information

### 12.1 Toxicity

**Components:**

**Toluene:**



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| | | |
|---|---|---|
| Toxicity to fish | : | LC50 (Oncorhynchus kisutch (coho salmon)): 5,5 mg/l<br>End point: mortality<br>Exposure time: 96 h<br>Test Type: flow-through test<br>Analytical monitoring: yes<br>Remarks: (ECHA) |
| Toxicity to daphnia and other aquatic invertebrates | : | EC50 (Ceriodaphnia dubia (water flea)): 3,78 mg/l<br>End point: mortality<br>Exposure time: 48 h<br>Analytical monitoring: yes<br>Method: US-EPA |
| Toxicity to microorganisms | : | EC50 (Bacteria): 84 mg/l<br>Exposure time: 24 h<br>Test Type: static test<br>Remarks: (ECHA) |
| Toxicity to fish (Chronic toxicity) | : | NOEC: 1,39 mg/l<br>End point: Growth inhibition<br>Exposure time: 40 d<br>Species: Oncorhynchus kisutch (coho salmon)<br>Test Type: flow-through test<br>Analytical monitoring: yes<br>Remarks: (ECHA) |
| Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) | : | NOEC: 0,74 mg/l<br>End point: reproduction rate<br>Exposure time: 7 d<br>Species: Ceriodaphnia dubia (water flea)<br>Analytical monitoring: yes<br>Method: US-EPA |

### 12.2 Persistence and degradability

**Components:**

**Toluene:**

| | | |
|---|---|---|
| Biodegradability | : | Test Type: aerobic<br>Result: Readily biodegradable.<br>Biodegradation: 86 %<br>Exposure time: 20 d<br>Remarks: (IUCLID) |

### 12.3 Bioaccumulative potential

**Components:**

**Toluene:**

| | | |
|---|---|---|
| Bioaccumulation | : | Species: Leuciscus idus (Golden orfe)<br>Exposure time: 3 d<br>Concentration: 0,05 mg/l<br>Bioconcentration factor (BCF): 90 |



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| | | |
|---|---|---|
| Partition coefficient: n-octanol/water | : | log Pow: 2,73 (20 °C)<br>pH: 7<br>Remarks: Bioaccumulation is not expected. |

### 12.4 Mobility in soil

No data available

### 12.5 Results of PBT and vPvB assessment

**Product:**

| | | |
|---|---|---|
| Assessment | : | This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. |

### 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. |

No data available

### 12.7 Other adverse effects

No data available

## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

| | | |
|---|---|---|
| Product | : | Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. |

## SECTION 14: Transport information

### 14.1 UN number or ID number

| | | |
|---|---|---|
| **ADR** | : | UN 1294 |
| **IMDG** | : | UN 1294 |
| **IATA** | : | UN 1294 |

### 14.2 UN proper shipping name

| | | |
|---|---|---|
| **ADR** | : | TOLUENE |
| **IMDG** | : | TOLUENE |



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| | | |
|---|---|---|
| **IATA** | : | Toluene |

### 14.3 Transport hazard class(es)

| | | Class | Subsidiary risks |
|---|---|---|---|
| **ADR** | : | 3 | |
| **IMDG** | : | 3 | |
| **IATA** | : | 3 | |

### 14.4 Packing group

**ADR**

| | | |
|---|---|---|
| Packing group | : | II |
| Classification Code | : | F1 |
| Hazard Identification Number | : | 33 |
| Labels | : | 3 |
| Tunnel restriction code | : | (D/E) |

**IMDG**

| | | |
|---|---|---|
| Packing group | : | II |
| Labels | : | 3 |
| EmS Code | : | F-E, S-D |

**IATA (Cargo)**

| | | |
|---|---|---|
| Packing instruction (cargo aircraft) | : | 364 |
| Packing instruction (LQ) | : | Y341 |
| Packing group | : | II |
| Labels | : | Class 3 - Flammable liquids |

**IATA_P (Passenger)**

| | | |
|---|---|---|
| Packing instruction (passenger aircraft) | : | 353 |
| Packing instruction (LQ) | : | Y341 |
| Packing group | : | II |
| Labels | : | Class 3 - Flammable liquids |

### 14.5 Environmental hazards

**ADR**

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

**IMDG**

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

### 14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

### 14.7 Maritime transport in bulk according to IMO instruments

Not applicable for product as supplied.



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## SECTION 15: Regulatory information

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

| | | |
|---|---|---|
| REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII) | : | Conditions of restriction for the following entries should be considered:<br>Number on list 3<br><br>Number on list 40<br><br>Number on list 75: If you intend to use this product as tattoo ink, please contact your vendor. Banned and/or restricted |
| REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59). | : | Not applicable |
| Regulation (EU) No 2024/590 on substances that deplete the ozone layer | : | Not applicable |
| Regulation (EU) 2019/1021 on persistent organic pollutants (recast) | : | Not applicable |
| REACH - List of substances subject to authorisation (Annex XIV) | : | Not applicable |

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

### 15.2 Chemical safety assessment

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

## SECTION 16: Other information

H336 : May cause drowsiness or dizziness.

**Full text of other abbreviations**

STOT SE : Specific target organ toxicity - single exposure

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 -



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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 Harmonised 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 Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; 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 - Organisation 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**

| | | |
|---|---|---|
| Other information | : | The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale. |
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**Annex: Exposure scenario**

**Identified uses:**

**Use: Used as chemical intermediate**

| |
|---|
| **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites |
| **SU 3, SU8, SU9:** Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of bulk, large scale chemicals (including petroleum products), Manufacture of fine chemicals |
| **PC19:** Intermediate |
| **PROC1:** Use in closed process, no likelihood of exposure<br>**PROC2:** Use in closed, continuous process with occasional controlled exposure<br>**PROC3:** Use in closed batch process (synthesis or formulation)<br>**PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises<br>**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities<br>**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities<br>**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing) |
| **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates) |

**Use: Formulation of preparations**

| |
|---|
| **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites |
| **SU 3, SU 10:** Industrial uses: Uses of substances as such or in preparations at industrial sites, Formulation [mixing] of preparations and/ or re-packaging (excluding alloys) |
| **PROC1:** Use in closed process, no likelihood of exposure<br>**PROC2:** Use in closed, continuous process with occasional controlled exposure<br>**PROC3:** Use in closed batch process (synthesis or formulation)<br>**PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises<br>**PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)<br>**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities<br>**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities<br>**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)<br>**PROC14:** Production of preparations or articles by tabletting, compression, extrusion, pelletisation |
| **ERC2:** Formulation of preparations |

**Use: Used as laboratory reagent**

| |
|---|
| **SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen) |
| **SU 22, SU 3:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Industrial uses: Uses of substances as such or in preparations at industrial sites |
| **PC21:** Laboratory chemicals |
| **PROC15:** Use as laboratory reagent |



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| |
|---|
| **ERC8a:** Wide dispersive indoor use of processing aids in open systems |

**Use: Surface treatment**

| |
|---|
| **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites |
| **SU 3, SU9:** Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of fine chemicals |
| **PC35:** Washing and cleaning products (including solvent based products)<br>**PC24:** Lubricants, greases, release products |
| **PROC7:** Industrial spraying<br>**PROC10:** Roller application or brushing<br>**PROC13:** Treatment of articles by dipping and pouring |
| **ERC4, ERC7:** Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of substances in closed systems |

## 1. Short title of Exposure Scenario: Used as chemical intermediate

| | | |
|---|---|---|
| Main User Groups | : | **SU 3** |
| Sectors of end-use | : | **SU 3, SU8, SU9** |
| Chemical product category | : | **PC19** |
| Process categories | : | **PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9** |
| Environmental Release Categories | : | **ERC6a:** |

## 2. Exposure scenario

### 2.1 Contributing scenario controlling environmental exposure for: ERC6a

**Product characteristics**

| | | |
|---|---|---|
| Concentration of the Substance in Mixture/Article | : | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |

### 2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PC19

**Product characteristics**

| | | |
|---|---|---|
| Concentration of the Substance in Mixture/Article | : | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |
| Physical Form (at time of use) | : | Medium volatile liquid |

**Frequency and duration of use**

| | | |
|---|---|---|
| Application duration | : | > 4 h |
| Frequency of use | : | 220 days/year |



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**Other operational conditions affecting workers exposure**
Outdoor / Indoor : Indoor

**Technical conditions and measures**
Provide adequate ventilation., Good work practice required.

**Organisational measures to prevent /limit releases, dispersion and exposure**
Ensure operatives are trained to minimise exposures.

**Conditions and measures related to personal protection, hygiene and health evaluation**
Use suitable eye protection and gloves., For personal protection see section 8.

## 3. Exposure estimation and reference to its source

### Environment

A chemical safety assessment was performed according REACH Article 14(3), Annex I, sections 3 (Environmental Hazard assessment) and 4 (PBT/vPvB Assessment). As no hazard was identified, an exposure assessment and risk characterisation is not necessary (REACH Annex I section 5.0).

### Workers

| Contributing Scenario | Exposure Assessment Method | Specific conditions | Value | Level of Exposure | RCR* |
|---|---|---|---|---|---|
| PROC1 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 0,0038 mg/m³ | 0 |
| PROC1 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 0,34 mg/kg BW/d | 0,001 |
| PROC2 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 40 mg/m³ | 0,208 |
| PROC2 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 1,37 mg/kg BW/d | 0,004 |
| PROC3 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 0,34 mg/kg BW/d | 0,001 |
| PROC3 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 90 mg/m³ | 0,469 |
| PROC4 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |
| PROC4 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 80 mg/m³ | 0,417 |
| PROC8a | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 13,71 mg/kg BW/d | 0,036 |



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| | | | | | |
|---|---|---|---|---|---|
| PROC8a | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC8b | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |
| PROC8b | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC9 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC9 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |

*Risk characterisation ratio

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).

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**1. Short title of Exposure Scenario: Formulation of preparations**

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Main User Groups : **SU 3**
Sectors of end-use : **SU 3, SU 10**
Process categories : **PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14**
Environmental Release Categories : **ERC2:**

**2. Exposure scenario**

**2.1 Contributing scenario controlling environmental exposure for: ERC2**

**Product characteristics**
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).

**2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14**

**Product characteristics**
Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Medium volatile liquid

**Frequency and duration of use**
Application duration : > 4 h
Frequency of use : 220 days/year



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**Other operational conditions affecting workers exposure**
Outdoor / Indoor : Indoor

**Technical conditions and measures**
Provide adequate ventilation., Good work practice required.

**Organisational measures to prevent /limit releases, dispersion and exposure**
Ensure operatives are trained to minimise exposures.

**Conditions and measures related to personal protection, hygiene and health evaluation**
Use suitable eye protection and gloves., For personal protection see section 8.

## 3. Exposure estimation and reference to its source

### Environment

A chemical safety assessment was performed according REACH Article 14(3), Annex I, sections 3 (Environmental Hazard assessment) and 4 (PBT/vPvB Assessment). As no hazard was identified, an exposure assessment and risk characterisation is not necessary (REACH Annex I section 5.0).

### Workers

| Contributing Scenario | Exposure Assessment Method | Specific conditions | Value | Level of Exposure | RCR* |
|---|---|---|---|---|---|
| PROC1 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 0,34 mg/kg BW/d | 0,001 |
| PROC1 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 0,0038 mg/m³ | 0 |
| PROC2 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 40 mg/m³ | 0,208 |
| PROC2 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 1,37 mg/kg BW/d | 0,004 |
| PROC3 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 0,34 mg/kg BW/d | 0,001 |
| PROC3 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 90 mg/m³ | 0,469 |
| PROC4 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |
| PROC4 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 80 mg/m³ | 0,417 |
| PROC5 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 13,71 mg/kg BW/d | 0,036 |



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| | | | | | |
|---|---|---|---|---|---|
| PROC5 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC8a | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 13,71 mg/kg BW/d | 0,036 |
| PROC8a | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC8b | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |
| PROC8b | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC9 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC9 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 6,86 mg/kg BW/d | 0,018 |
| PROC14 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC14 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 3,43 mg/kg BW/d | 0,009 |

*Risk characterisation ratio

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).

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**1. Short title of Exposure Scenario: Used as laboratory reagent**

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Main User Groups : **SU 22**
Sectors of end-use : **SU 22, SU 3**
Chemical product category : **PC21**
Process categories : **PROC15**
Environmental Release Categories : **ERC8a:**

**2. Exposure scenario**

**2.1 Contributing scenario controlling environmental exposure for: ERC8a**

**Product characteristics**
Concentration of the Substance in : Covers the percentage of the substance in the product



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Mixture/Article up to 100 % (unless stated differently).

### 2.2 Contributing scenario controlling worker exposure for: PROC15, PC21

**Product characteristics**

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Medium volatile liquid

**Frequency and duration of use**

Application duration : > 4 h
Frequency of use : 220 days/year

**Other operational conditions affecting workers exposure**

Outdoor / Indoor : Indoor

**Technical conditions and measures**

Provide adequate ventilation., Good work practice required.

**Organisational measures to prevent /limit releases, dispersion and exposure**

Ensure operatives are trained to minimise exposures.

**Conditions and measures related to personal protection, hygiene and health evaluation**

Use suitable eye protection and gloves., For personal protection see section 8.

## 3. Exposure estimation and reference to its source

**Environment**

A chemical safety assessment was performed according REACH Article 14(3), Annex I, sections 3 (Environmental Hazard assessment) and 4 (PBT/vPvB Assessment). As no hazard was identified, an exposure assessment and risk characterisation is not necessary (REACH Annex I section 5.0).

**Workers**

| Contributing Scenario | Exposure Assessment Method | Specific conditions | Value | Level of Exposure | RCR* |
|---|---|---|---|---|---|
| PROC15 | ECETOC TRA | Without Local Exhaust Ventilation | Inhalation | 40 mg/m³ | 0,208 |
| PROC15 | ECETOC TRA | Without Local Exhaust Ventilation | Dermal | 0,34 mg/kg BW/d | 0,001 |

*Risk characterisation ratio

## 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).



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## 1. Short title of Exposure Scenario: Surface treatment

| | | |
|---|---|---|
| Main User Groups | : | **SU 3** |
| Sectors of end-use | : | **SU 3, SU9** |
| Chemical product category | : | **PC35, PC24** |
| Process categories | : | **PROC7, PROC10, PROC13** |
| Environmental Release Categories | : | **ERC4, ERC7:** |

## 2. Exposure scenario

### 2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC7

**Product characteristics**

| | | |
|---|---|---|
| Concentration of the Substance in Mixture/Article | : | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |

### 2.2 Contributing scenario controlling worker exposure for: PROC7, PROC10, PROC13, PC35, PC24

**Product characteristics**

| | | |
|---|---|---|
| Concentration of the Substance in Mixture/Article | : | Covers the percentage of the substance in the product up to 100 % (unless stated differently). |
| Physical Form (at time of use) | : | Medium volatile liquid |

**Frequency and duration of use**

| | | |
|---|---|---|
| Application duration | : | > 4 h |
| Frequency of use | : | 220 days/year |

**Other operational conditions affecting workers exposure**

| | | |
|---|---|---|
| Outdoor / Indoor | : | Indoor |

**Technical conditions and measures**

Use only in area provided with appropriate exhaust ventilation., Good work practice required.

**Organisational measures to prevent /limit releases, dispersion and exposure**

Ensure operatives are trained to minimise exposures.

**Conditions and measures related to personal protection, hygiene and health evaluation**

Use suitable eye protection and gloves., For personal protection see section 8.

## 3. Exposure estimation and reference to its source

**Environment**

A chemical safety assessment was performed according REACH Article 14(3), Annex I, sections 3 (Environmental Hazard assessment) and 4 (PBT/vPvB Assessment). As no hazard was identified, an exposure assessment and risk characterisation is not necessary (REACH Annex I section 5.0).

**Workers**

| Contributin | Exposure | Specific | Value | Level of | RCR* |
|---|---|---|---|---|---|



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| g Scenario | Assessment Method | conditions | | Exposure | |
|---|---|---|---|---|---|
| PROC7 | ECETOC TRA | With Local Exhaust Ventilation | Dermal | 42,86 mg/kg BW/d | 0,112 |
| PROC7 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 10 mg/m³ | 0,052 |
| PROC10 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |
| PROC10 | ECETOC TRA | With Local Exhaust Ventilation | Dermal | 27,43 mg/kg BW/d | 0,071 |
| PROC13 | ECETOC TRA | With Local Exhaust Ventilation | Dermal | 13,71 mg/kg BW/d | 0,036 |
| PROC13 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 130 mg/m³ | 0,677 |

*Risk characterisation ratio

**4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario**

Please refer to the following documents: ECHA Guidance on information requirements and chemical safety assessment Part D: Exposure Scenario Building, Part E: Risk Characterisation and Part G: Extending the SDS; VCI/Cefic REACH Practical Guides on Exposure Assessment and Communications in the Supply Chain; CEFIC Guidance Specific Environmental Release Categories (SPERCs).



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