

## SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 6.0 Revision Date 06.12.2013

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**SECTION 1: Identification of the substance/mixture and of the company/undertaking****1.1 Product identifiers**

Product name : Tetrahydrofuran

Product Number : 401757

Brand : Sigma-Aldrich

Index-No. : 603-025-00-0

REACH No. : 01-2119444314-46-XXXX

CAS-No. : 109-99-9

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

Identified uses : Laboratory chemicals, Manufacture of substances

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

Company : Sigma-Aldrich Company Ltd.  
The Old Brickyard  
NEW ROAD, GILLINGHAM  
Dorset  
SP8 4XT  
UNITED KINGDOM

Telephone : +44 (0)1747 833000

Fax : +44 (0)1747 833313

E-mail address : eurtechserv@sial.com

**1.4 Emergency telephone number**

Emergency Phone # : +44 (0)1747 833100

**SECTION 2: Hazards identification****2.1 Classification of the substance or mixture****Classification according to Regulation (EC) No 1272/2008**

Flammable liquids (Category 2), H225

Eye irritation (Category 2), H319

Carcinogenicity (Category 2), H351

Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

**Classification according to EU Directives 67/548/EEC or 1999/45/EC**

F Highly flammable R11, R19

Xi Irritant R36/37

R40

For the full text of the R-phrases mentioned in this Section, see Section 16.

**2.2 Label elements****Labelling according Regulation (EC) No 1272/2008**

Pictogram



Signal word

Danger

|                                      |  |
|--------------------------------------|--|
| Hazard statement(s)                  |  |
| H225                                 | Highly flammable liquid and vapour.  |
| H319                                 | Causes serious eye irritation.   |
| H335                                 | May cause respiratory irritation.  |
| H351                                 | Suspected of causing cancer.   |
| Precautionary statement(s)           |  |
| P210                                 | Keep away from heat/sparks/open flames/hot surfaces. - No smoking.   |
| P261                                 | Avoid breathing vapours.   |
| P281                                 | Use personal protective equipment as required.   |
| P305 + P351 + P338                   | IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. |
| Supplemental Hazard information (EU) |  |
| EUH019                               | May form explosive peroxides.  |

## 2.3 Other hazards - none

### SECTION 3: Composition/information on ingredients

#### 3.1 Substances

|                     |                                   |
|---------------------|-----------------------------------|
| Synonyms            | : THF                             |
| Formula             | : C <sub>4</sub> H <sub>8</sub> O |
| Molecular Weight    | : 72.11 g/mol                     |
| CAS-No.             | : 109-99-9                        |
| EC-No.              | : 203-726-8                       |
| Index-No.           | : 603-025-00-0                    |
| Registration number | : 01-2119444314-46-XXXX           |

#### Hazardous ingredients according to Regulation (EC) No 1272/2008

| Component                                 | Classification   | Concentration |
|---|--|---------------|
| <b>Tetrahydrofuran</b>                    |  |               |
| CAS-No. 109-99-9                          | Flam. Liq. 2; Eye Irrit. 2; Carc. 2; STOT SE 3; H225, H319, H335, H351, EUH019 | <= 100 %      |
| EC-No. 203-726-8                          |  |               |
| Index-No. 603-025-00-0                    |  |               |
| Registration number 01-2119444314-46-XXXX |  |               |

#### Hazardous ingredients according to Directive 1999/45/EC

| Component                                 | Classification                              | Concentration |
|---|---|---------------|
| <b>Tetrahydrofuran</b>                    |   |               |
| CAS-No. 109-99-9                          | F, Xn, Carc.Cat.3, R11 - R19 - R40 - R36/37 | <= 100 %      |
| EC-No. 203-726-8                          |   |               |
| Index-No. 603-025-00-0                    |   |               |
| Registration number 01-2119444314-46-XXXX |   |               |

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

### SECTION 4: First aid measures

#### 4.1 Description of first aid measures

##### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

##### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**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

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**SECTION 5: Firefighting measures****5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

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

Carbon oxides

**5.3 Advice for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

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**SECTION 6: Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**6.4 Reference to other sections**

For disposal see section 13.

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**SECTION 7: Handling and storage****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

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

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**7.3 Specific end use(s)**

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

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**SECTION 8: Exposure controls/personal protection****8.1 Control parameters**

Components with workplace control parameters

| Component       | CAS-No.  | Value   | Control parameters   | Basis  |
|-----------------|----------|---|----------------------|--|
| Tetrahydrofuran | 109-99-9 | STEL  | 100 ppm<br>300 mg/m3 | UK. EH40 WEL - Workplace Exposure Limits   |
|                 | Remarks  | Can be absorbed through skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity. |                      |  |
|                 |          | TWA   | 50 ppm<br>150 mg/m3  | UK. EH40 WEL - Workplace Exposure Limits   |
|                 |          | Can be absorbed through skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity. |                      |  |
|                 |          | TWA   | 50 ppm<br>150 mg/m3  | Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values |
|                 |          | Identifies the possibility of significant uptake through the skin<br>Indicative   |                      |  |
|                 |          | STEL  | 100 ppm<br>300 mg/m3 | Europe. Commission Directive 2000/39/EC establishing a first list of indicative occupational exposure limit values |
|                 |          | Identifies the possibility of significant uptake through the skin<br>Indicative   |                      |  |

#### Derived No Effect Level (DNEL)

| Application Area | Exposure routes | Health effect              | Value        |
|------------------|-----------------|----------------------------|--------------|
| Workers          | Skin contact    | Long-term systemic effects | 25mg/kg BW/d |
| Consumers        | Skin contact    | Long-term systemic effects | 15mg/kg BW/d |
| Workers          | Inhalation      | Long-term local effects    | 150 mg/m3    |
| Workers          | Inhalation      | Long-term systemic effects | 150 mg/m3    |
| Consumers        | Inhalation      | Long-term systemic effects | 62 mg/m3     |
| Consumers        | Inhalation      | Acute local effects        | 150 mg/m3    |
| Consumers        | Inhalation      | Acute systemic effects     | 150 mg/m3    |

#### Predicted No Effect Concentration (PNEC)

| Compartment                   | Value      |
|-------------------------------|------------|
| Soil                          | 2.13 mg/kg |
| Marine water                  | 0.432 mg/l |
| Fresh water                   | 4.32 mg/l  |
| Marine sediment               | 2.33 mg/kg |
| Fresh water sediment          | 23.3 mg/kg |
| Onsite sewage treatment plant | 4.6 mg/l   |

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of

contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Splash contact

Material: butyl-rubber

Minimum layer thickness: 0.3 mm

Break through time: 18 min

Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,

test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

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## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

- |   |  |
|---|--|
| a) Appearance                                   | Form: liquid, clear<br>Colour: colourless  |
| b) Odour  | no data available  |
| c) Odour Threshold                              | no data available  |
| d) pH   | no data available  |
| e) Melting point/freezing point                 | -108.0 °C  |
| f) Initial boiling point and boiling range      | 65.0 - 67.0 °C   |
| g) Flash point                                  | -17.0 °C - closed cup  |
| h) Evaporation rate                             | no data available  |
| i) Flammability (solid, gas)                    | no data available  |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 11.8 %(V)<br>Lower explosion limit: 1.8 %(V)                          |
| k) Vapour pressure                              | 152.0 hPa at 15.0 °C<br>190.7 hPa at 20.0 °C<br>213.3 hPa at 25.0 °C<br>373.3 hPa at 38.0 °C |

|   |   |
|---|---|
| l) Vapour density                         | no data available   |
| m) Relative density                       | 0.89 g/cm <sup>3</sup>  |
| n) Water solubility                       | soluble   |
| o) Partition coefficient: n-octanol/water | log Pow: < 1  |
| p) Auto-ignition temperature              | 321.0 °C  |
| q) Decomposition temperature              | no data available   |
| r) Viscosity                              | 0.512 mm <sup>2</sup> /s at 25 °C - 0.403 mm <sup>2</sup> /s at 50 °C - |
| s) Explosive properties                   | no data available   |
| t) Oxidizing properties                   | no data available   |

## 9.2 Other safety information

no data available

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## SECTION 10: Stability and reactivity

### 10.1 Reactivity

no data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

no data available

### 10.4 Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### 10.5 Incompatible materials

Oxidizing agents, Oxygen

### 10.6 Hazardous decomposition products

Other decomposition products - no data available  
In the event of fire: see section 5

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## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - rat - 2,050 - 2,850 mg/kg

LC50 Inhalation - rat - 4 h - 54 mg/l

LD50 Dermal - rat - > 2,000 mg/kg

#### Skin corrosion/irritation

Skin - rabbit

Result: Mild skin irritation  
(Draize Test)

#### Serious eye damage/eye irritation

Eyes - rabbit

Result: Risk of serious damage to eyes.  
(Draize Test)

#### Respiratory or skin sensitisation

- guinea pig

Did not cause sensitisation on laboratory animals.

**Germ cell mutagenicity**

In vivo tests did not show mutagenic effects

Ames test

S. typhimurium

Result: negative

**Carcinogenicity**

Suspected human carcinogens

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**Reproductive toxicity**

No toxicity to reproduction

**Specific target organ toxicity - single exposure**

May cause drowsiness or dizziness. - Nervous system

May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**

The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

**Aspiration hazard**

No aspiration toxicity classification

**Additional Information**

RTECS: LU5950000

Central nervous system depression, Cough, chest pain, Difficulty in breathing, Exposure to high airborne concentrations can cause anesthetic effects., To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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**SECTION 12: Ecological information****12.1 Toxicity**

Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 2,160 mg/l - 96 h

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 382 mg/l - 24 h

Toxicity to algae Growth inhibition IC50 - Algae - 3,700 mg/l - 192 h

**12.2 Persistence and degradability**

Biodegradability

(OECD Test Guideline 301)

Remarks: According to the results of tests of biodegradability this product is not readily biodegradable.

**12.3 Bioaccumulative potential**

No bioaccumulation is to be expected (log Pow <= 4).

**12.4 Mobility in soil**

no data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

no data available

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## SECTION 13: Disposal considerations

### 13.1 Waste treatment methods

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

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## SECTION 14: Transport information

### 14.1 UN number

ADR/RID: 2056

IMDG: 2056

IATA: 2056

### 14.2 UN proper shipping name

ADR/RID: TETRAHYDROFURAN

IMDG: TETRAHYDROFURAN

IATA: Tetrahydrofuran

### 14.3 Transport hazard class(es)

ADR/RID: 3

IMDG: 3

IATA: 3

### 14.4 Packaging group

ADR/RID: II

IMDG: II

IATA: II

### 14.5 Environmental hazards

ADR/RID: no

IMDG Marine pollutant: no

IATA: no

### 14.6 Special precautions for user

no data available

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## SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

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

no data available

### 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 H-Statements referred to under sections 2 and 3.

|            |  |
|------------|--|
| Carc.      | Carcinogenicity                                  |
| EUH019     | May form explosive peroxides.                    |
| Eye Irrit. | Eye irritation                                   |
| Flam. Liq. | Flammable liquids                                |
| H225       | Highly flammable liquid and vapour.              |
| H319       | Causes serious eye irritation.                   |
| H335       | May cause respiratory irritation.                |
| H351       | Suspected of causing cancer.                     |
| STOT SE    | Specific target organ toxicity - single exposure |

### Full text of R-phrases referred to under sections 2 and 3

|     |                               |
|-----|-------------------------------|
| F   | Highly flammable              |
| Xn  | Harmful                       |
| R11 | Highly flammable.             |
| R19 | May form explosive peroxides. |



R36/37 Irritating to eyes and respiratory system.  
R40 Limited evidence of a carcinogenic effect.

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. 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](http://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

|  |
|--|
| <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites  |
| <b>SU 3, SU9:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of fine chemicals    |
| <b>PC19:</b> Intermediate  |
| <b>PROC1:</b> Use in closed process, no likelihood of exposure   |
| <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure  |
| <b>PROC3:</b> Use in closed batch process (synthesis or formulation)   |
| <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises   |
| <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities |
| <b>PROC15:</b> Use as laboratory reagent   |
| <b>ERC1:</b> Manufacture of substances   |

#### Use: Formulation of preparations

|   |
|---|
| <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites   |
| <b>SU 10:</b> Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)  |
| <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure   |
| <b>PROC3:</b> Use in closed batch process (synthesis or formulation)  |
| <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises  |
| <b>PROC5:</b> Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) |
| <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities    |
| <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing)                     |
| <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation                                 |
| <b>PROC15:</b> Use as laboratory reagent  |
| <b>ERC2:</b> Formulation of preparations  |

#### Use: Industrial use of processing aids in processes and products, not becoming part of articles

|  |
|--|
| <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites  |
| <b>SU 3, SU9:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites, Manufacture of fine chemicals                        |
| <b>PC20:</b> Products such as ph-regulators, flocculants, pre-cipitants, neutralization agents   |
| <b>PC21:</b> Laboratory chemicals  |
| <b>PROC1:</b> Use in closed process, no likelihood of exposure   |
| <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure  |
| <b>PROC3:</b> Use in closed batch process (synthesis or formulation)   |
| <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises   |
| <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities                     |
| <b>PROC9:</b> Transfer of substance or preparation into small containers (dedicated filling line, including weighing)                                      |
| <b>PROC10:</b> Roller application or brushing  |
| <b>PROC15:</b> Use as laboratory reagent   |
| <b>ERC4, ERC6b:</b> Industrial use of processing aids in processes and products, not becoming part of articles, Industrial use of reactive processing aids |

#### Use: Used as laboratory reagent.

|   |
|---|
| <b>SU 22:</b> Professional uses: Public domain (administration, education, entertainment, services, craftsmen)  |
| <b>SU 3, SU 22, SU24:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites, Professional uses: Public domain (administration, education, entertainment, services, craftsmen), Scientific research and development |
| <b>PC21:</b> Laboratory chemicals   |
| <b>PROC15:</b> Use as laboratory reagent  |

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

Main User Groups : SU 3  
 Sectors of end-use : SU 3, SU9  
 Chemical product category : PC19  
 Process categories : PROC1, PROC2, PROC3, PROC4, PROC8b, PROC15  
 Environmental Release Categories : ERC1:

## 2. Exposure scenario

### 2.1 Contributing scenario controlling environmental exposure for: ERC1

#### 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, PROC8b, PROC15, 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) : High 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

Wear suitable gloves tested to EN374., 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                 | With Local Exhaust Ventilation | Dermal     | 0.34 mg/kg BW/d   | 0.014 |
| PROC1                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 0 mg/m3           | 0     |
| PROC2                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 15.023 mg/m3      | 0.1   |

|        |            |                                |            |                  |       |
|--------|------------|--------------------------------|------------|------------------|-------|
| PROC2  | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.14 mg/kg BW/d  | 0.006 |
| PROC3  | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3     | 0.2   |
| PROC3  | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.034 mg/kg BW/d | 0.001 |
| PROC4  | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.686 mg/kg BW/d | 0.027 |
| PROC4  | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3     | 0.2   |
| PROC8b | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.69 mg/kg BW/d  | 0.028 |
| PROC8b | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 13.521 mg/m3     | 0.09  |
| PROC15 | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.03 mg/kg BW/d  | 0.001 |
| PROC15 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3     | 0.2   |

\*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).

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

Main User Groups : **SU 3**  
Sectors of end-use : **SU 10**  
Process categories : **PROC2, PROC3, PROC4, PROC5, PROC8b, PROC9, PROC14, PROC15**  
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: PROC2, PROC3, PROC4, PROC5, PROC8b, PROC9, PROC14, PROC15

###### 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) : High 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**

Wear suitable gloves tested to EN374., 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*  |
|-----------------------|----------------------------|--------------------------------|------------|-------------------|-------|
| PROC2                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.14 mg/kg BW/d   | 0.006 |
| PROC2                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 15.023 mg/m3      | 0.1   |
| PROC3                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.034 mg/kg BW/d  | 0.001 |
| PROC3                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3      | 0.2   |
| PROC4                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.686 mg/kg BW/d  | 0.027 |
| PROC4                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3      | 0.2   |
| PROC5                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 75.115 mg/m3      | 0.501 |
| PROC5                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.069 mg/kg BW/d  | 0.003 |
| PROC8b                | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 13.521 mg/m3      | 0.09  |
| PROC8b                | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.69 mg/kg BW/d   | 0.028 |
| PROC9                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.69 mg/kg BW/d   | 0.028 |
| PROC9                 | ECETOC TRA                 | With Local Exhaust             | Inhalation | 60.092 mg/m3      | 0.401 |

|        |            |                                |            |                 |       |
|--------|------------|--------------------------------|------------|-----------------|-------|
|        |            | Ventilation                    |            |                 |       |
| PROC14 | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.34 mg/kg BW/d | 0.014 |
| PROC14 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 75.115 mg/m3    | 0.501 |
| PROC15 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3    | 0.2   |
| PROC15 | ECETOC TRA | With Local Exhaust Ventilation | Dermal     | 0.03 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).

#### 1. Short title of Exposure Scenario: Industrial use of processing aids in processes and products, not becoming part of articles

|                                  |   |
|----------------------------------|---|
| Main User Groups                 | : SU 3  |
| Sectors of end-use               | : SU 3, SU9   |
| Chemical product category        | : PC20, PC21  |
| Process categories               | : PROC1, PROC2, PROC3, PROC4, PROC8b, PROC9, PROC10, PROC15 |
| Environmental Release Categories | : ERC4, ERC6b:  |

#### 2. Exposure scenario

##### 2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC6b

###### 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, PROC8b, PROC9, PROC10, PROC15, PC20, 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) : High 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

Wear suitable gloves tested to EN374., 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                 | With Local Exhaust Ventilation | Dermal     | 0.34 mg/kg BW/d   | 0.014 |
| PROC1                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 0 mg/m3           | 0     |
| PROC2                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 15.023 mg/m3      | 0.1   |
| PROC2                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.14 mg/kg BW/d   | 0.006 |
| PROC3                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3      | 0.2   |
| PROC3                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.034 mg/kg BW/d  | 0.001 |
| PROC4                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.686 mg/kg BW/d  | 0.027 |
| PROC4                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3      | 0.2   |
| PROC8b                | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 13.521 mg/m3      | 0.09  |
| PROC8b                | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.69 mg/kg BW/d   | 0.028 |
| PROC9                 | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 0.69 mg/kg BW/d   | 0.028 |
| PROC9                 | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 60.092 mg/m3      | 0.401 |
| PROC10                | ECETOC TRA                 | With Local Exhaust Ventilation | Dermal     | 1.371 mg/kg BW/d  | 0.055 |
| PROC10                | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 75.115 mg/m3      | 0.501 |
| PROC15                | ECETOC TRA                 | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3      | 0.2   |
| PROC15                | ECETOC TRA                 | With Local Exhaust             | Dermal     | 0.03 mg/kg BW/d   | 0.001 |

|  |  |             |  |  |  |
|--|--|-------------|--|--|--|
|  |  | Ventilation |  |  |  |
|--|--|-------------|--|--|--|

\*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).

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

Main User Groups : SU 22  
 Sectors of end-use : SU 3, SU 22, SU24  
 Chemical product category : PC21  
 Process categories : PROC15  
 Environmental Release Categories : ERC2, ERC6a, ERC6b:

#### 2. Exposure scenario

##### 2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC6a, ERC6b

###### 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: 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) : High 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

Wear suitable gloves tested to EN374., 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                 | With Local Exhaust Ventilation | Dermal | 0.03 mg/kg BW/d   | 0.001 |



|        |            |                                |            |              |     |
|--------|------------|--------------------------------|------------|--------------|-----|
| PROC15 | ECETOC TRA | With Local Exhaust Ventilation | Inhalation | 30.046 mg/m3 | 0.2 |
|--------|------------|--------------------------------|------------|--------------|-----|

\*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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