

# SAFETY DATA SHEET

## SODIUM CHLORATE

Ref. 1.7/REG\_EU/EN

SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006

Revision Date: 17.04.2019

Previous date: 05.10.2018

Print Date:25.09.2019

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## Annex

### Contents: Exposure scenario

#### 1. Manufacturing of solution

SU 3; ERC1; PROC1, PROC2, PROC8a, PROC8b, PROC9, PROC15;

#### 2. Manufacturing of solid chemical

SU 3; ERC1; PROC1, PROC2, PROC8a, PROC8b, PROC9, PROC15;

#### 3. Pulp and paper bleaching

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#### 4. Use as intermediate, (synthesis of chlorates, perchlorates and chlorite)

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#### 10. Use in the metal finishing industry

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#### 12. Manufacture of pyrotechnic products

SU 3; ERC2; PROC4, PROC8a, PROC8b, PROC14, PROC15;

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### 1. Short title of Exposure Scenario: Manufacturing of solution

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC1:** Use in closed process, no likelihood of exposure  
**PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC8a:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  
**PROC15:** Use as laboratory reagent
- Environmental release category : **ERC1:** Manufacture of substances

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

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#### Amount used

- Regional annual tonnage : 130000 t/a  
Annual amount per site : 72000 t/a  
Daily amount per site : 66664 kg/d

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 91  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 350  
Emission or Release Factor: Air : 0 %  
Emission or Release Factor: Water : 0,3 %  
Emission or Release Factor: Soil : 0,01 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99

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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment., Treat air emission to provide a typical removal efficiency of 99 %.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC1

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transfer from electrolysis reactor to crystallisation reactor, Transfer from crystallisation reactor to filtration reactor, Transfer from filtration reactor to dissolving tank, Waste management: recovery using condensation or adsorption/desorption processes - salt cake filter., ; Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.3 Contributing scenario controlling worker exposure for: PROC2

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### 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) : Liquid, vapour pressure < 10 Pa

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Electrolysis reactor, Crystallisation reactor, Filtration reactor, Dissolving tank, ;, Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

Waste management: transfer of process wastes to storage containers: off-line in workplace, ;, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.4 Contributing scenario controlling worker exposure for: PROC8a

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 5%.  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, ;, Drain down system prior to equipment opening or maintenance., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.5 Contributing scenario controlling worker exposure for: PROC8b

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### Product characteristics

Concentration of the Substance in : Covers the percentage of the substance in the product up to

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Mixture/Article 100 % (unless stated differently).  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : < 15 min

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Sampling from reactors., Sampling from dissolving tank, :, Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

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## 2.6 Contributing scenario controlling worker exposure for: PROC9

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Filling line - Transfer substance into drums, :, Fill containers/cans at dedicated filling points supplied with local extract ventilation., Put lids on containers immediately after use.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

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## 2.7 Contributing scenario controlling worker exposure for: PROC15

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### Product characteristics

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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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ; Handle in a fume cupboard or under extract ventilation., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC1	ECETOC TRA		local freshwater	PEC	0,00073mg/l	0,17315

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00273
PROC1	ECETOC TRA		Dermal exposure	0,34 mg/kg bw/day	0,0111
PROC2	ECETOC TRA		Inhalation exposure	0,10 ppm	0,0909
PROC2	ECETOC TRA		Dermal exposure	0,14 mg/kg bw/day	0,00445
PROC8a	ECETOC TRA		Inhalation exposure	0,36 ppm	0,327
PROC8a	ECETOC TRA		Dermal exposure	2,74 mg/kg bw/day	0,0891

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PROC8b	ECETOC TRA		Inhalation exposure	0,02 ppm	0,0136
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC9	ECETOC TRA		Inhalation exposure	0,50 ppm	0,455
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC15	ECETOC TRA		Inhalation exposure	0,10 ppm	0,0909
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Manufacturing of solid chemical

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Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC8a:</b> Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities <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>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC1:</b> Manufacture of substances

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

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#### Amount used

Regional annual tonnage	: 130000 t/a
Annual amount per site	: 72000 t/a
Daily amount per site	: 66664 kg/d

#### Environment factors not influenced by risk management

Dilution Factor (River)	: 91
Dilution Factor (Coastal Areas)	: 100
Remarks	: Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

Continuous use/release	
Number of emission days per year	: 350
Emission or Release Factor: Air	: 0 %
Emission or Release Factor: Water	: 0,3 %
Emission or Release Factor: Soil	: 0,01 %
Remarks	: Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

Air	: Treat air emission to provide a typical removal efficiency of 99
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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment., Treat air emission to provide a typical removal efficiency of 99 %.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC1

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### 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) : Solid, medium dustiness  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transfer from electrolysis reactor to crystallisation reactor, Transfer from crystallisation reactor to filtration reactor, Transfer from filtration reactor to dryer, Transfer from dryer to storage tanks, Waste management: recovery using condensation or adsorption/desorption processes - salt cake filter., ;, Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.3 Contributing scenario controlling worker exposure for: PROC2

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### Product characteristics

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

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Physical Form (at time of use) : Solid, medium dustiness, Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h

Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Electrolysis reactor, Crystallisation reactor, Filtration reactor, Dryer reactor tank, ; Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

Waste management: transfer of process wastes to storage containers: off-line in workplace, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.4 Contributing scenario controlling worker exposure for: PROC8a

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### 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) : Solid, medium dustiness, Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Daily cleaning of filling lines, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour., Clean equipment and the work area every day.

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, ; Drain down system prior to equipment opening or maintenance., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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### 2.5 Contributing scenario controlling worker exposure for: PROC8b

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#### 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) : Solid, medium dustiness, Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : 15 min - 1 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Sampling from reactors., ; Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes.

Loading of road tanks from storage tanks, ; Clear transfer lines prior to de-coupling., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

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### 2.6 Contributing scenario controlling worker exposure for: PROC9

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#### 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) : Solid, medium dustiness, Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Filling line - Transfer substance into bags (crystal solid), ; Fill containers/cans at dedicated filling points supplied with local extract ventilation., Put lids on containers immediately after use.

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

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Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

### 2.7 Contributing scenario controlling worker exposure for: 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) : Solid, medium dustiness, Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : 15 min - 1 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Laboratory use: QC laboratory use, ; Handle in a fume cupboard or under extract ventilation., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC1	ECETOC TRA		local freshwater	PEC	0,00073mg/l	0,17315

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00273
PROC1	ECETOC TRA		Dermal exposure	0,34 mg/kg bw/day	0,0111
PROC2	ECETOC TRA		Inhalation exposure	0,10 ppm	0,0909

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PROC2	ECETOC TRA		Dermal exposure	0,14 mg/kg bw/day	0,00445
PROC8a	ECETOC TRA		Inhalation exposure	0,13 ppm	0,114
PROC8a	ECETOC TRA		Dermal exposure	13,71 mg/kg bw/day	0,445
PROC8b	ECETOC TRA		Inhalation exposure	0,02 ppm	0,0190
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC9	ECETOC TRA		Inhalation exposure	0,21 ppm	0,190
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC15	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00380
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Pulp and paper bleaching

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC1:** Use in closed process, no likelihood of exposure  
**PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC8a:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC15:** Use as laboratory reagent
- Environmental release category : **ERC6b:** Industrial use of reactive processing aids

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

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#### Amount used

- Regional annual tonnage : 39450 t/a  
Daily amount per site : 88033 kg/d  
Daily amount per site (Msafe) : 88 033,31 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 1,51  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300  
Emission or Release Factor: Air : 0,001 %  
Emission or Release Factor: Water : 0,7 %  
Emission or Release Factor: Soil : 0,1 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.

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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Flow rate of sewage treatment : 35 000 m<sup>3</sup>/d  
plant effluent  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment., Treat air emission to provide a typical removal efficiency of 99 %.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC1

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transfer from storage tank to reactor., Waste management: recovery using condensation or adsorption/desorption processes - salt cake filter., ; Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.3 Contributing scenario controlling worker exposure for: PROC2

### 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) : Liquid, vapour pressure < 10 Pa

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Primary and secondary reactors (HP-A and Mathieson), SVP Generator reactor (SVP-lite), ;, Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

Waste management: transfer of process wastes to storage containers: off-line in workplace - dissolving tanks., ;, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., acetic acid

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.4 Contributing scenario controlling worker exposure for: PROC8a

---

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, ;, Drain down system prior to equipment opening or maintenance., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Avoid carrying out operation for more than 4 hours.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.5 Contributing scenario controlling worker exposure for: PROC8b

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### Product characteristics



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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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Loading bulk raw material (liquid) from road tanks to storage tanks., ; Clear transfer lines prior to decoupling., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Sampling from reactors., ; Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

---

## 2.6 Contributing scenario controlling worker exposure for: 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ; Handle in a fume cupboard or under extract ventilation., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

## 3. Exposure estimation and reference to its source

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### Environment

Contributing	Exposure	Specific	Compartment	Value type	Level of	Risk
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Scenario	Assessment Method	conditions			Exposure	characterisation ratio (PEC/PNEC):
ERC6b	ECETOC TRA		local freshwater	PEC	0,59265mg/l	0,59265

### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00273
PROC1	ECETOC TRA		Dermal exposure	0,34 mg/kg bw/day	0,0111
PROC2	ECETOC TRA		Inhalation exposure	0,20 ppm	0,182
PROC2	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,0445
PROC8a	ECETOC TRA		Inhalation exposure	0,36 ppm	0,327
PROC8a	ECETOC TRA		Dermal exposure	2,74 mg/kg bw/day	0,0891
PROC8b	ECETOC TRA		Inhalation exposure	0,03 ppm	0,0273
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC15	ECETOC TRA		Inhalation exposure	0,1 ppm	0,0909
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Use as intermediate, (synthesis of chlorates, perchlorates and chlorite)

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Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	: <b>PROC1:</b> Use in closed process, no likelihood of exposure <b>PROC2:</b> Use in closed, continuous process with occasional controlled exposure <b>PROC8a:</b> Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities <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
Environmental release category	: <b>ERC6a:</b> Industrial use resulting in manufacture of another substance (use of intermediates)

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

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#### Amount used

Regional annual tonnage	: 40000 t/a
Daily amount per site	: 33418 kg/d
Daily amount per site (Msafe)	: 33 418,27 kg/day

#### Environment factors not influenced by risk management

Dilution Factor (River)	: 10
Dilution Factor (Coastal Areas)	: 100
Remarks	: Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

Continuous use/release	
Number of emission days per year	: 300
Emission or Release Factor: Air	: 0,001 %
Emission or Release Factor: Water	: 0,7 %
Emission or Release Factor: Soil	: 0,1 %
Remarks	: Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

Air	: Treat air emission to provide a typical removal efficiency of 99
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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment., Treat air emission to provide a typical removal efficiency of 99 %.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC1

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Raw material dispensing via pipeline from storage tanks to reactors, Waste management: recovery using condensation or adsorption/desorption processes - salt cake filter., ; Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.3 Contributing scenario controlling worker exposure for: PROC2

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### 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) : Liquid, vapour pressure < 10 Pa

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Reactor synthesis in closed continuous process, ; Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur. Waste management: transfer of process wastes to storage containers: off-line in workplace, ; Provide a good standard of general or controlled ventilation (5 to 15 air changes per hour)., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.4 Contributing scenario controlling worker exposure for: PROC3

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Reactor synthesis in batch process, ; Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.5 Contributing scenario controlling worker exposure for: PROC8a

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### Product characteristics

Concentration of the Substance in : Covers the percentage of the substance in the product up to

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Mixture/Article 100 % (unless stated differently).  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, ; Drain down system prior to equipment opening or maintenance., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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## 2.6 Contributing scenario controlling worker exposure for: PROC8b

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Loading bulk raw material (liquid) from road tanks to storage tanks., ; Clear transfer lines prior to decoupling., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Loading material (liquid) from drums to storage tanks using aspiration thief., ; Fill containers/cans at dedicated filling points supplied with local extract ventilation., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Sampling from reactors., ; Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

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### 2.7 Contributing scenario controlling worker exposure for: PROC15

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#### 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) : Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : 15 min - 1 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Laboratory use: QC laboratory use, ; Handle in a fume cupboard or under extract ventilation., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

### 3. Exposure estimation and reference to its source

---

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC6a	ECETOC TRA		local freshwater	PEC	0,99260mg/l	0,99260

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00273
PROC1	ECETOC TRA		Dermal exposure	0,34 mg/kg bw/day	0,0111
PROC2	ECETOC TRA		Inhalation exposure	0,10 ppm	0,0909
PROC2	ECETOC TRA		Dermal exposure	0,14 mg/kg bw/day	0,00445
PROC3	ECETOC TRA		Inhalation	0,30 ppm	0,273



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			exposure		
PROC3	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111
PROC8a	ECETOC TRA		Inhalation exposure	0,36 ppm	0,327
PROC8a	ECETOC TRA		Dermal exposure	2,74 mg/kg bw/day	0,0891
PROC8b	ECETOC TRA		Inhalation exposure	0,03 ppm	0,0273
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC15	ECETOC TRA		Inhalation exposure	0,10 ppm	0,0909
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Repackaging, Aqueous solution

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC3:** Use in closed batch process (synthesis or formulation)  
**PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)  
**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- Environmental release category : **ERC2:** Formulation of preparations

---

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

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#### Amount used

- Regional annual tonnage : 3500 t/a  
Daily amount per site : 18033 kg/d  
Daily amount per site (Msafe) : 18 033,64 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.

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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC2

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Waste management: transfer of process wastes to storage containers: off-line in workplace, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.3 Contributing scenario controlling worker exposure for: PROC3

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

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### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transfer by pipeline from storage tanks to feed hopper (solid), ;, Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

Storage of drums (liquid), ;, Carefully pour from containers.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

---

## 2.4 Contributing scenario controlling worker exposure for: PROC5

---

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.5 Contributing scenario controlling worker exposure for: PROC8a

---

### Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 5%.  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

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Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, ; Drain down system prior to equipment opening or maintenance., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

### 2.6 Contributing scenario controlling worker exposure for: PROC8b

---

#### 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) : Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : 15 min - 1 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Loading bulk raw material (liquid) from road tanks to storage tanks., ; Clear transfer lines prior to decoupling., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Loading material (liquid) from drums to storage tanks using aspiration thief., ; Fill containers/cans at dedicated filling points supplied with local extract ventilation., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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### 2.7 Contributing scenario controlling worker exposure for: PROC9

---

#### 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) : Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated

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differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Filling line - from feed hopper to drums (liquid), :, Fill containers/cans at dedicated filling points supplied with local extract ventilation., Put lids on containers immediately after use.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear suitable gloves tested to EN374.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC2	ECETOC TRA		local freshwater	PEC	0,99260mg/l	0,99260

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC2	ECETOC TRA		Inhalation exposure	0,01 ppm	0,0114
PROC2	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,0445
PROC3	ECETOC TRA		Inhalation exposure	0,30 ppm	0,273
PROC3	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111
PROC5	ECETOC TRA		Inhalation exposure	0,5 ppm	0,442
PROC5	ECETOC TRA		Dermal exposure	0,07 mg/kg/day	0,0223
PROC8a	ECETOC TRA		Inhalation exposure	0,08 ppm	0,0685
PROC8a	ECETOC TRA		Dermal exposure	2,74 mg/kg bw/day	0,0891
PROC8b	ECETOC TRA		Inhalation	0,03 ppm	0,0273

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			exposure		
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC9	ECETOC TRA		Inhalation exposure	0,50 ppm	0,455
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Repackaging

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC3:** Use in closed batch process (synthesis or formulation)  
**PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)  
**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
- Environmental release category : **ERC2:** Formulation of preparations

---

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

---

#### Amount used

- Regional annual tonnage : 3500 t/a  
Daily amount per site : 18033 kg/d  
Daily amount per site (Msafe) : 18 033,64 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.



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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC2

### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Waste management: transfer of process wastes to storage containers: off-line in workplace, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.3 Contributing scenario controlling worker exposure for: PROC3

### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

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### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transfer by pipeline from storage tanks to feed hopper (solid), ; Transfer via enclosed lines., Ensure material transfers are under containment or extract ventilation.

Storage of bags (crystal solid), ; Carefully pour from containers.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.4 Contributing scenario controlling worker exposure for: PROC5

### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Ensure material transfers are under containment or extract ventilation.

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

Assumes a good basic standard of occupational hygiene is implemented.

---

## 2.5 Contributing scenario controlling worker exposure for: PROC8a

### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 1 - 4 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

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### Technical conditions and measures

Daily cleaning of filling lines (crystal solid), :, Clean equipment and the work area every day., Avoid carrying out operation for more than 1 hour., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

Manufacturing equipment maintenance: Opening and cleaning manufacturing equipment for maintenance purposes, :, Limit the substance content in the product to 5 %., Drain down system prior to equipment opening or maintenance., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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### 2.6 Contributing scenario controlling worker exposure for: PROC8b

#### 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)      : Solid, medium dustiness

#### Frequency and duration of use

Duration of the activity      : 15 min - 1 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor      : Indoor

### Technical conditions and measures

Loading bulk raw material (crystal solid) from road tanks to storage tanks, :, Clear transfer lines prior to de-coupling., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Loading manually material (crystal solid) from bags to storage tank, :, Fill containers/cans at dedicated filling points supplied with local extract ventilation., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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### 2.7 Contributing scenario controlling worker exposure for: PROC9

#### 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)      : Solid, medium dustiness

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Filling line - from feed hopper to bags (crystal solid), :, Fill containers/cans at dedicated filling points supplied with local extract ventilation., Put lids on containers immediately after use.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear protective gloves/ protective clothing/ eye protection/ face protection.Wear suitable gloves tested to EN374.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC2	ECETOC TRA		local freshwater	PEC	0,99260mg/l	0,99260

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC2	ECETOC TRA		Inhalation exposure	0,01 ppm	0,0114
PROC2	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,0445
PROC3	ECETOC TRA		Inhalation exposure	0,04 ppm	0,0380
PROC3	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,00111
PROC5	ECETOC TRA		Inhalation exposure	0,11 ppm	0,102
PROC5	ECETOC TRA		Dermal exposure	0,07 mg/kg/day	0,0223

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PROC8a	ECETOC TRA		Inhalation exposure	0,13 ppm	0,114
PROC8a	ECETOC TRA		Dermal exposure	13,71 mg/kg bw/day	0,445
PROC8b	ECETOC TRA		Inhalation exposure	0,03 ppm	0,019
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223
PROC9	ECETOC TRA		Inhalation exposure	0,21 ppm	0,190
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,0223

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Use for bleaching or oxidizing mineral compounds, Aqueous solution

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC3:** Use in closed batch process (synthesis or formulation)  
**PROC8a:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities
- Environmental release category : **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)

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

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#### Amount used

- Regional annual tonnage : 8000 t/a  
Daily amount per site : 32284 kg/d  
Daily amount per site (Msafe) : 32 284,38 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300  
Emission or Release Factor: Air : 0,001 %  
Emission or Release Factor: Water : 0,7 %  
Emission or Release Factor: Soil : 0,1 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99

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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC2

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 1 %  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Waste management: transfer of process wastes to storage containers: off-line in workplace - dissolving tanks., ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.3 Contributing scenario controlling worker exposure for: PROC3

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### 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) : Liquid, vapour pressure < 10 Pa

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production in closed batch process (synthesis or formulation), ; Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.4 Contributing scenario controlling worker exposure for: PROC8a

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 1 %  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: opening of manufacturing equipment and pipework containing chemicals for repair, ; Drain down system prior to equipment opening or maintenance., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Manufacturing equipment maintenance: cleaning manufacturing equipment for maintenance purposes, ; Drain down system prior to equipment opening or maintenance., Retain drain downs in sealed storage pending disposal or for subsequent recycle.

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

Assumes a good basic standard of occupational hygiene is implemented.



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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

### 2.5 Contributing scenario controlling worker exposure for: PROC8b

#### 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) : Liquid, vapour pressure < 10 Pa

#### Frequency and duration of use

Duration of the activity : 1 - 4 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Receipt and storage of raw materials: loading from road tank to storage tank, ; Clear transfer lines prior to de-coupling., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

Raw material assembly and charging: raw material dispensing of solid manually from bulk storage or packaged goods, ; Fill containers/cans at dedicated filling points supplied with local extract ventilation., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Sampling from reactors and ancillary equipment, ; Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes., Limit the substance content in the product to 1 %.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC6a	ECETOC TRA		local freshwater	PEC	0,72594mg/l	0,20164

#### Workers

Contributing	Exposure Assessment	Specific	Value type	Level of	Risk characterisation
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Scenario	Method	conditions		Exposure	ratio (PEC/PNEC):
PROC2	ECETOC TRA		Inhalation exposure	0,01 ppm	0,00712
PROC2	ECETOC TRA		Dermal exposure	0,14 mg/kg bw/day	0,0445
PROC3	ECETOC TRA		Inhalation exposure	0,30 ppm	0,265
PROC3	ECETOC TRA		Dermal exposure	< 0,01 mg/kg bw/day	0,00111
PROC8a	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC8a	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,445
PROC8b	ECETOC TRA		Inhalation exposure	0,88 ppm	0,427
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Use for bleaching or oxidizing mineral compounds

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC2:** Use in closed, continuous process with occasional controlled exposure  
**PROC3:** Use in closed batch process (synthesis or formulation)  
**PROC8a:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/discharging) from/ to vessels/ large containers at dedicated facilities
- Environmental release category : **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)

---

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

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#### Amount used

- Regional annual tonnage : 8000 t/a  
Daily amount per site : 32284 kg/d  
Daily amount per site (Msafe) : 32 284,38 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300  
Emission or Release Factor: Air : 0,001 %  
Emission or Release Factor: Water : 0,7 %  
Emission or Release Factor: Soil : 0,1 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.

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### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC2

### Product characteristics

Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 1 %.  
Physical Form (at time of use) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Waste management: transfer of process wastes to storage containers: off-line in workplace - dissolving tanks., ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.3 Contributing scenario controlling worker exposure for: PROC3

### 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) : Solid, medium dustiness

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### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production in closed batch process (synthesis or formulation), ;, Handle substance within a predominantly closed system provided with extract ventilation., Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

---

## 2.4 Contributing scenario controlling worker exposure for: PROC8a

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers percentage substance in the product up to 1 %  
Physical Form (at time of use) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance: opening of manufacturing equipment and pipework containing chemicals for repair, ;, Drain down system prior to equipment opening or maintenance., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours., Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Manufacturing equipment maintenance: cleaning manufacturing equipment for maintenance purposes, ;, Drain down system prior to equipment opening or maintenance., Retain drain downs in sealed storage pending disposal or for subsequent recycle.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

### 2.5 Contributing scenario controlling worker exposure for: PROC8b

#### 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) : Solid, medium dustiness

#### Frequency and duration of use

Duration of the activity : 1 - 4 h

#### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

#### Technical conditions and measures

Receipt and storage of raw materials: loading from road tank to storage tank, ; Clear transfer lines prior to de-coupling., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

Raw material assembly and charging: raw material dispensing of solid manually from bulk storage or packaged goods, ; Fill containers/cans at dedicated filling points supplied with local extract ventilation., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Sampling from reactors and ancillary equipment, ; Ensure samples are obtained under containment or extract ventilation., Avoid carrying out operation for more than 15 minutes., Limit the substance content in the product to 1 %.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC6a	ECETOC TRA		local freshwater	PEC	0,72594mg/l	0,20164

#### Workers

Contributing Scenario	Exposure Assessment	Specific conditions	Value type	Level of Exposure	Risk characterisation
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	Method				ratio (PEC/PNEC):
PROC2	ECETOC TRA		Inhalation exposure	0,01 ppm	0,00712
PROC2	ECETOC TRA		Dermal exposure	0,14 mg/kg bw/day	0,0445
PROC3	ECETOC TRA		Inhalation exposure	0,30 ppm	0,265
PROC3	ECETOC TRA		Dermal exposure	< 0,01 mg/kg bw/day	0,00111
PROC8a	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC8a	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,445
PROC8b	ECETOC TRA		Inhalation exposure	0,88 ppm	0,427
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Use in the metal finishing industry, Aqueous solution

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises  
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  
**PROC15:** Use as laboratory reagent
- Environmental release category : **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)

---

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

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#### Amount used

- Regional annual tonnage : 8000 t/a  
Daily amount per site : 32284 kg/d  
Daily amount per site (Msafe) : 32 284,38 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300  
Emission or Release Factor: Air : 0,001 %  
Emission or Release Factor: Water : 0,7 %  
Emission or Release Factor: Soil : 0,1 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.

#### Conditions and measures related to municipal sewage treatment plant

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Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC4

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.  
Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa  
Process Temperature : < 60 °C

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production in batch and other process (synthesis) where opportunity for exposure arises: oxidation of Zinc in a solution, ; Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 15 minutes., Limit the substance content in the product to 25 %., Wear suitable respiratory protection (conforming to EN140 with Type A filter or better) and gloves (type EN374) if regular skin contact likely.

General production in batch and other process (synthesis) where opportunity for exposure arises, ; Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

General production in batch and other process (synthesis) where opportunity for exposure arises: Oxidation of Ferum in a solution, ; Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

General production in batch and other process (synthesis) where opportunity for exposure arises: oxidation of CuCl to CuCl<sub>2</sub> in a hydrochloric solution, ; Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Other general production in batch process where opportunity for exposure arises, ; Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour., Limit the substance content in the product to 5 %.

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Manufacturing equipment cleaning: enclosed in situ in workplace, ; Limit the substance content in the product to 5 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour.

Waste management: Transfer of recovered solvent into bulk storage tanks or IBCs, ; Limit the substance content in the product to 5 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Use suitable eye protection and gloves., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

---

## 2.3 Contributing scenario controlling worker exposure for: PROC8b

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### 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)      : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity      : < 15 min

### Other operational conditions affecting workers exposure

Outdoor / Indoor      : Indoor

### Technical conditions and measures

Sampling for quality control of raw material, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid splashing., Wear suitable respiratory protection (conforming to EN140 with Type A filter or better) and gloves (type EN374) if regular skin contact likely.

Sampling from reactors and ancillary equipment, ; Limit the substance content in the product to 25 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.4 Contributing scenario controlling worker exposure for: PROC9

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### Product characteristics

Concentration of the Substance in Mixture/Article      Covers the percentage of the substance in the product up to 25 %.

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Physical Form (at time of use) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transferring of substance or preparation into small containers (dedicated filling line), ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour. Transferring of substance or preparation into small containers (dedicated filling line), ; Limit the substance content in the product to 5 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

---

## 2.5 Contributing scenario controlling worker exposure for: PROC15

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ; Limit the substance content in the product to 25 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour.  
Preparation of a 500 g/l solution, ; Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 15 minutes.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC6a	ECETOC TRA		local freshwater	PEC	0,72594mg/l	0,20164

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC4	ECETOC TRA		Inhalation exposure	0,70 ppm	0,619
PROC4	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC8b	ECETOC TRA		Inhalation exposure	0,21 ppm	0,186
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC9	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC15	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,0111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Use in the metal finishing industry

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- Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
- Process category : **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises  
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC9:** Transfer of substance or preparation into small containers (dedicated filling line, including weighing)  
**PROC15:** Use as laboratory reagent
- Environmental release category : **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates)

---

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

---

#### Amount used

- Regional annual tonnage : 8000 t/a  
Daily amount per site : 32284 kg/d  
Daily amount per site (Msafe) : 32 284,38 kg/day

#### Environment factors not influenced by risk management

- Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100  
Remarks : Product applied in aqueous process solution with negligible volatilization.

#### Other given operational conditions affecting environmental exposure

- Continuous use/release  
Number of emission days per year : 300  
Emission or Release Factor: Air : 0,001 %  
Emission or Release Factor: Water : 0,7 %  
Emission or Release Factor: Soil : 0,1 %  
Remarks : Discharge to aquatic environment is restricted.

#### Technical conditions and measures / Organizational measures

- Air : Treat air emission to provide a typical removal efficiency of 99 %.

#### Conditions and measures related to municipal sewage treatment plant

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Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

---

## 2.2 Contributing scenario controlling worker exposure for: PROC4

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### Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 25 %.  
Physical Form (at time of use) : Solid, medium dustiness  
Process Temperature : < 60 °C

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production in batch and other process (synthesis) where opportunity for exposure arises: oxidation of Zinc in a solution, :, Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 15 minutes., Limit the substance content in the product to 25 %., Wear suitable respiratory protection (conforming to EN140 with Type A filter or better) and gloves (type EN374) if regular skin contact likely.

General production in batch and other process (synthesis) where opportunity for exposure arises, :, Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

General production in batch and other process (synthesis) where opportunity for exposure arises: Oxidation of Ferum in a solution, :, Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

General production in batch and other process (synthesis) where opportunity for exposure arises: oxidation of CuCl to CuCl<sub>2</sub> in a hydrochloric solution, :, Limit the substance content in the product to 1 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

Other general production in batch process where opportunity for exposure arises, :, Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour., Limit the substance content in the product to 5 %.

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Manufacturing equipment cleaning: enclosed in situ in workplace, ; Limit the substance content in the product to 5 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour.

Waste management: Transfer of recovered solvent into bulk storage tanks or IBCs, ; Limit the substance content in the product to 5 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Use suitable eye protection and gloves., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.3 Contributing scenario controlling worker exposure for: PROC8b

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### 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)      : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity      : < 15 min

### Other operational conditions affecting workers exposure

Outdoor / Indoor      : Indoor

### Technical conditions and measures

Sampling for quality control of raw material, ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid splashing., Wear suitable respiratory protection (conforming to EN140 with Type A filter or better) and gloves (type EN374) if regular skin contact likely.

Sampling from reactors and ancillary equipment, ; Limit the substance content in the product to 25 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

---

## 2.4 Contributing scenario controlling worker exposure for: PROC9

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### Product characteristics

Concentration of the Substance in Mixture/Article      Covers the percentage of the substance in the product up to 25 %.

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Physical Form (at time of use) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Transferring of substance or preparation into small containers (dedicated filling line), ; Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour. Transferring of substance or preparation into small containers (dedicated filling line), ; Limit the substance content in the product to 5 %., Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 1 hour.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.5 Contributing scenario controlling worker exposure for: PROC15

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### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ; Limit the substance content in the product to 25 %., Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 1 hour.

Preparation of a 500 g/l solution, ; Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 15 minutes.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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### 3. Exposure estimation and reference to its source

#### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC6a	ECETOC TRA		local freshwater	PEC	0,72594mg/l	0,20164

#### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC4	ECETOC TRA		Inhalation exposure	0,70 ppm	0,619
PROC4	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC8b	ECETOC TRA		Inhalation exposure	0,21 ppm	0,186
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC9	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC9	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC15	ECETOC TRA		Inhalation exposure	0,42 ppm	0,372
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,0111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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### 1. Short title of Exposure Scenario: Manufacture of pyrotechnic products, Aqueous solution

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Main User Groups : **SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites

Process category : **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises  
**PROC8a:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities  
**PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities  
**PROC14:** Production of preparations or articles by tableting, compression, extrusion, pelletisation  
**PROC15:** Use as laboratory reagent

Environmental release category : **ERC2:** Formulation of preparations

---

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

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#### Amount used

Regional annual tonnage : 3500 t/a  
Daily amount per site : 18033 kg/d  
Daily amount per site (Msafe) : 18 033,64 kg/day

#### Environment factors not influenced by risk management

Dilution Factor (River) : 10  
Dilution Factor (Coastal Areas) : 100

#### Other given operational conditions affecting environmental exposure

Continuous use/release  
Number of emission days per year : 300

#### Technical conditions and measures / Organizational measures

Air : Treat air emission to provide a typical removal efficiency of 99 %.

#### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant : A municipal STP and/or on-site treatment is assumed.  
Effectiveness (of a measure) : 91,5 %  
Sludge Treatment : No application of sewage sludge to soil

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### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC4

### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production (formulation) in batch process where opportunity of exposure arise (solid), :, Provide extraction ventilation at points where emissions occur.

Waste management: transfer of process wastes to storage containers: off-line in workplace, :, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.3 Contributing scenario controlling worker exposure for: PROC8a

### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 1 - 4 h

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### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance and cleaning, ;, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.4 Contributing scenario controlling worker exposure for: PROC8b

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Loading from bags to reactors, ;, Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 4 hours.

Sampling from reactors., ;, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

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## 2.5 Contributing scenario controlling worker exposure for: PROC14

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### 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

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Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Tabletting, compression, extrusion, pelletisation (pyrotechnics), ;, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

## 2.6 Contributing scenario controlling worker exposure for: 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) : Liquid, vapour pressure < 10 Pa

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ;, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

## 3. Exposure estimation and reference to its source

### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
ERC2	ECETOC TRA		local freshwater	PEC	0,99260mg/l	0,99260

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### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC4	ECETOC TRA		Inhalation exposure	0,48 ppm	0,427
PROC4	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC8a	ECETOC TRA		Inhalation exposure	0,48 ppm	0,427
PROC8a	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,445
PROC8b	ECETOC TRA		Inhalation exposure	0,06 ppm	0,0508
PROC8b	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC14	ECETOC TRA		Inhalation exposure	0,02 ppm	0,0203
PROC14	ECETOC TRA		Dermal exposure	0,34 mg/kg bw/day	0,111
PROC15	ECETOC TRA		Inhalation exposure	< 0,01 ppm	0,00203
PROC15	ECETOC TRA		Dermal exposure	0,03 mg/kg bw/day	0,0111

Worst case scenario, Risk from environmental exposure is driven by fresh water., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1., When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.

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

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.



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### 1. Short title of Exposure Scenario: Manufacture of pyrotechnic products

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Main User Groups	: <b>SU 3:</b> Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category	: <b>PROC4:</b> Use in batch and other process (synthesis) where opportunity for exposure arises <b>PROC8a:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities <b>PROC8b:</b> Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities <b>PROC14:</b> Production of preparations or articles by tableting, compression, extrusion, pelletisation <b>PROC15:</b> Use as laboratory reagent
Environmental release category	: <b>ERC2:</b> Formulation of preparations

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

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#### Amount used

Regional annual tonnage	: 3500 t/a
Daily amount per site	: 18033 kg/d
Daily amount per site (Msafe)	: 18 033,64 kg/day

#### Environment factors not influenced by risk management

Dilution Factor (River)	: 10
Dilution Factor (Coastal Areas)	: 100

#### Other given operational conditions affecting environmental exposure

Continuous use/release	
Number of emission days per year	: 300

#### Technical conditions and measures / Organizational measures

Air	: Treat air emission to provide a typical removal efficiency of 99 %.
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#### Conditions and measures related to municipal sewage treatment plant

Type of Sewage Treatment Plant	: A municipal STP and/or on-site treatment is assumed.
Effectiveness (of a measure)	: 91,5 %
Sludge Treatment	: No application of sewage sludge to soil

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### Conditions and measures related to external treatment of waste for disposal

Waste treatment : Provide a total waste water removal efficiency of >91,5 %, with either onsite or domestic waste water treatment.

### Conditions and measures related to external recovery of waste

Recovery Methods : External treatment and disposal of waste should comply with applicable local and/or national regulations.

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## 2.2 Contributing scenario controlling worker exposure for: PROC4

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### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

General production (formulation) in batch process where opportunity of exposure arise (solid), :, Provide extraction ventilation at points where emissions occur.

Waste management: transfer of process wastes to storage containers: off-line in workplace, :, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan., Avoid carrying out operation for more than 4 hours.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.3 Contributing scenario controlling worker exposure for: PROC8a

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### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 1 - 4 h

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### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Manufacturing equipment maintenance and cleaning, :, Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.

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## 2.4 Contributing scenario controlling worker exposure for: PROC8b

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### 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Loading from bags to reactors, :, Provide extraction ventilation at points where emissions occur., Avoid carrying out operation for more than 4 hours.

Sampling from reactors., :, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

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## 2.5 Contributing scenario controlling worker exposure for: PROC14

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### 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) : Solid, medium dustiness

### Frequency and duration of use

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Duration of the activity : > 4 h  
Remarks : Covers daily exposures up to 8 hours (unless stated differently).

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Tabletting, compression, extrusion, pelletisation (pyrotechnics), ;, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

## 2.6 Contributing scenario controlling worker exposure for: 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) : Solid, medium dustiness

### Frequency and duration of use

Duration of the activity : 15 min - 1 h

### Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

### Technical conditions and measures

Laboratory use: QC laboratory use, ;, Provide extraction ventilation at points where emissions occur.

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

Assumes a good basic standard of occupational hygiene is implemented.

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

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

## 3. Exposure estimation and reference to its source

### Environment

Contributing Scenario	Exposure Assessment Method	Specific conditions	Compartment	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
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### Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC4	ECETOC TRA		Inhalation exposure	0,48 ppm	0,427
PROC4	ECETOC TRA		Dermal exposure	0,69 mg/kg bw/day	0,223
PROC8a	ECETOC TRA		Inhalation exposure	0,48 ppm	0,427
PROC8a	ECETOC TRA		Dermal exposure	1,37 mg/kg bw/day	0,445
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#### 4. Guidance to Downstream User to evaluate whether he works inside the boundaries set by the Exposure Scenario

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Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels., For scaling see: <http://www.ecetoc.org/tra>, If scaling reveals a condition of unsafe use (i.e. RCRs>1), additional RMMs or a site-specific chemical safety assessment is required.

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