HYDROCHLORIC ACID 31%

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

1.1 Product identifier

HYDROCHLORIC ACID 31%

Chemical name: hydrochloric acid

Index-No.: 017-002-01-X

REACH Registration Number: 01-2119484862-27-0001, 01-2119484862-27-0006

Material number: 05451159

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

Use:
Starting material for industrial applications
For details of the identified uses according to REACH-Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

Uses advised against:

- Any use involving aerosol formation or vapor release in excess of 10 ppm where workers are exposed without respiratory protection
- Any uses involving direct releases to air / surface water that cannot be buffered by natural systems to maintain pH at the naturally occurring level

1.3 Details of the supplier of the safety data sheet

Covestro Deutschland AG
COV-CTO-HSEQ-PSRA-PSI
D-51365 LEVERKUSEN

Tel.: +49 214 6009 4068
e−mail: ProductSafetyEMLA@covestro.com

1.4 Emergency telephone number

+1-703-527-3887 (Chemtrec)
National Chemical Emergency Centre - UK
Tel: +44 1865 407 333

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Corrosive to metals, Category 1 (H290)
Skin corrosion, Sub-category 1B (H314)
Serious eye damage, Category 1 (H318)
Specific target organ toxicity (single exposure), Category 3 (H335)

2.2 Label elements

Danger

Hazardous components which must be listed on the label
hydrochloric acid … %
Index-No.: 017-002-00-2

Hazard statements:
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.

Precautionary statements:
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.
P301 + P330 + P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.

2.3 Other hazards

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

SECTION 3: Composition/information on ingredients

Type of product: Substance

3.1 Substances

Hazardous components

hydrochloric acid … %
Concentration [wt.-%]: 30 - 33
Index-No.: 017-002-00-2
EC-No.: 231-595-7
REACH Registration Number: 01-2119484862-27-0001, 01-2119484862-27-0006
CAS-No.: 7647-01-0
Classification (1272/2008/CE): Met. Corr. 1 H290 Skin Corr. 1B H314 Eye Dam. 1 H318 STOT SE 3 H335
Specific threshold concentration (GHS):

Met. Corr. 1	H290	>= 0.1 %
Skin Corr. 1B	H314	>= 25 %
Eye Dam. 1	H318	>= 25 %
Skin Irrit. 2	H315	10 - < 25 %
Eye Irrit. 2	H319	10 - < 25 %
STOT SE 3	H335	>= 10 %

Candidate List of Substances of Very High Concern for Authorisation
This product contains no substances of very high concern in concentrations where an information obligation applies (REACH Regulation (EC) No. 1907/2006, Article 59).

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice: Remove victims from the danger zone without endangering your own safety. Remove contaminated clothing (including underwear and shoes) immediately.

If inhaled: Bring accident victims out into the fresh air. If patient has difficulty in breathing, administer oxygen, keep the patient calm and warm. Call a physician immediately.

In case of skin contact: After contact with skin, wash immediately with plenty of water. Apply sterile protective bandage; consult GP.

In case of eye contact: Hold the eyes open and rinse with preferably lukewarm water for a sufficiently long period of time (at least 10 minutes). Contact an ophthalmologist.

If swallowed: If swallowed, rinse mouth with water (only if the person is conscious). DO NOT induce the patient to vomit, medical advice is required.

4.2 Most important symptoms and effects, both acute and delayed

Notes to physician: See Section 11 for information on toxicology.

4.3 Indication of any immediate medical attention and special treatment needed

Therapeutic measures: Basic first aid, decontamination, symptomatic treatment. Treat with a corticoid metered aerosol depending on the amount inhaled.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media: Carbon dioxide (CO2), Foam, extinguishing powder, in cases of larger fires, water spray should be used.

Unsuitable extinguishing media: High volume water jet

5.2 Special hazards arising from the substance or mixture

Burning releases carbon monoxide, carbon dioxide, oxides of nitrogen and traces of hydrogen cyanide. In the event of fire and/or explosion do not breathe fumes.

5.3 Advice for fire-fighters

During fire-fighting respirator with independent air-supply and airtight garment is required.

Fight fire in early stages if safe to do so. Containers at risk from fire should be cooled with water and, if possible, removed from the danger area. Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Put on protective equipment (see section 8). Ensure adequate ventilation/exhaust extraction. Keep unauthorized persons away.

6.2 Environment related measures

Do not flush into surface water or sanitary sewer system.

6.3 Methods and material for containment and cleaning up

Take up with absorbent for chemicals or, if necessary with dry sand. Fill into labeled, sealable containers. Also place used cleaning materials into closable receptacles.

6.4 Reference to other sections

For further disposal measures see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

General conditions of use are further specified in the annex according to REACH-Regulation (EU) No. 1907/2006.

Handle and open container with care. Provide sufficient air exchange and/or exhaust in work rooms.

Organize work procedures so that workers are not exposed to the effects of the products. Vent waste air only via suitable separators or scrubbers.

Precautions should generally be taken against electrostatic charges according to the equipment used and the way the product is handled and packaged.

The precautions required in the handling of irritant or corrosive substances must be taken. Contact with skin and eyes and inhalation of vapors must be avoided under all circumstances.

Careful attention to industrial and personal hygiene is essential. Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at the end of workday. Keep working clothes separately. Change contaminated or soaked clothing immediately. If the full protective suit becomes contaminated, first take a shower with the suit on.

7.2 Conditions for safe storage, including any incompatibilities

Keep container dry and tightly closed in a cool and well ventilated place.

Storage class (TRGS 510) : 8B: Non-combustible, corrosive hazardous materials

7.3 Specific end use(s)

For details of the identified uses according to REACH-Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

SECTION 8: Exposure controls/personal protection

Risk management measures are further specified in the annex according to REACH-Regulation (EU) No. 1907/2006.

UK Workplace Exposure Limits (WEL), per EH40 document (Health & Safety Executive). If no UK value exists, EU exposure limits given where available.

8.1 Control parameters

Components with workplace control parameters

Substance	CAS-No.	Basis	Type	Value	Ceiling Limit Value	Remarks
hydrochloric acid … %	7647-01-0	EH40 WEL	STEL	5 ppm 8 mg/m3		
hydrochloric acid … %	7647-01-0	EH40 WEL	TWA	1 ppm 2 mg/m3		
hydrochloric acid … %	7647-01-0	EU ELV	STEL	10 ppm 15 mg/m3		Indicative
hydrochloric acid … %	7647-01-0	EU ELV	TWA	5 ppm 8 mg/m3		Indicative

Derived No Effect Level (DNEL)

hydrochloric acid … %

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic		No hazard identified

		effects		
Workers	Inhalation	Acute systemic effects		No hazard identified
Workers	Inhalation	Long-term local effects	8 mg/m3	Most sensitive endpoint: Irritation (respiratory tract)
Workers	Inhalation	Acute local effects	15 mg/m3	Most sensitive endpoint: Irritation (respiratory tract)
Workers	Dermal	Long-term systemic effects		No hazard identified
Workers	Dermal	Acute systemic effects		No hazard identified
Workers	Dermal	Long-term local effects		High hazard (no threshold derived) . Most sensitive endpoint: skin irritation/corrosion
Workers	Dermal	Acute local effects		High hazard (no threshold derived) . Most sensitive endpoint: skin irritation/corrosion
Workers	Eye contact	Local effects		Medium hazard (no threshold derived)
Consumers	Inhalation	Long-term systemic effects		No hazard identified
Consumers	Inhalation	Acute systemic effects		No hazard identified
Consumers	Inhalation	Long-term local effects	8 mg/m3	Most sensitive endpoint: Irritation (respiratory tract)
Consumers	Inhalation	Acute local effects	15 mg/m3	Most sensitive endpoint: Irritation (respiratory tract)
Consumers	Dermal	Long-term systemic effects		No hazard identified
Consumers	Dermal	Acute systemic effects		No hazard identified
Consumers	Dermal	Long-term local effects		High hazard (no threshold derived) . Most sensitive endpoint: skin irritation/corrosion
Consumers	Dermal	Acute local effects		High hazard (no threshold derived) . Most sensitive endpoint: skin irritation/corrosion
Consumers	Oral	Long-term systemic effects		No hazard identified
Consumers	Oral	Acute systemic effects		No hazard identified
Consumers	Eye contact	Local effects		Medium hazard (no threshold derived)

Predicted No Effect Concentration (PNEC)

hydrochloric acid … %

Compartment	Value	Remarks
Fresh water		No hazard identified
Fresh water sediment		No hazard identified
Marine water		No hazard identified
Marine sediment		No hazard identified
Sewage treatment plant		No hazard identified

Soil		Exposure of the soil is not expected.
Oral		Does not bioaccumulate.

8.2 Exposure controls

Appropriate engineering controls
For technical protective measures to limit exposure see also Section 7 "Handling and storage".

Respiratory protection
If vapors form, respirators must be used. In the event of vapors up to 0,5 % vol. percent, use a filtered respirator with DIN EN 141 B-P2 (color code grey/white) combination filter and with DIN 141 B-P3 combination filter up to 1 % vol. At higher concentrations or under uncertain conditions a respirator with independent air supply must be used.

If applicable, further recommendations regarding respiratory protection can be found in the annex.

Hand protection
Suitable materials for safety gloves; EN 374:
Nitrile rubber - NBR: thickness >=0,35mm; breakthrough time >=480min.
Butyl rubber - IIR: thickness >=0,5mm; breakthrough time >=480min.
Fluorinated rubber - FKM: thickness >=0,4mm; breakthrough time >=480min.
Polyvinyl chloride - PVC: thickness >=0,5mm; breakthrough time >=480min.
Recommendation: contaminated gloves should be disposed of.

Eye protection
Wear eye/face protection.

Skin and body protection
Impervious protective clothing. On possible contact with the product (sampling, product leakage): full protection or chemical protection clothing.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance:	liquid	
Colour:	yellowish	
Odour:	stinging	
Odour Threshold:	not established	
pH:	< 1 at 300 g/l at 20 °C	
Melting point/range:	-50 °C	
Boiling point/boiling range:	85 °C at 1,013 hPa	
Flash point:	does not flash	
Evaporation rate:	not established	
Flammability (solid, gas):	not applicable	
Burning number:	not applicable	
Vapour pressure:	21.8 hPa at 20 °C	
Vapour density:	not established	
Density:	1.154 g/cm³ at 20 °C	DIN 51757
Miscibility with water:	miscible at 15 °C	
Surface tension:	not established	
Partition coefficient (n−octanol/water):	not established	
Auto-ignition temperature:	not applicable	
Ignition temperature:	not applicable	
Decomposition temperature:	not established	
Heat of combustion:	not established	
Viscosity, dynamic:	2 mPa.s at 15 °C	

9.2 Other information

The indicated values do not necessarily correspond to the product specification. Please refer to the product information sheet or the technical information sheet for specification data.

Explosive properties:	not established
Dust explosion class:	not applicable
Oxidising properties:	not established

SECTION 10: Stability and reactivity

10.1 Reactivity

This information is not available.

10.2 Chemical stability

This information is not available.

10.3 Possibility of hazardous reactions

Reacts violently with alkalis and metals (eg.) Aluminium, Magnesium, Zinc under generation of hydrogen

10.4 Conditions to avoid

This information is not available.

10.5 Incompatible materials

This information is not available.

10.6 Hazardous decomposition products

No hazardous decomposition products when stored and handled correctly.

SECTION 11: Toxicological information

Please find below the data available to us:

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity, oral
hydrochloric acid … %
Study scientifically not justified.

Acute toxicity, dermal
hydrochloric acid … %
Study scientifically not justified.

Acute toxicity, inhalation
hydrochloric acid … %
LC50 rat, male: 45.6 mg/l, 5 min
Test atmosphere: dust/mist

LC50 rat, male: 8.3 mg/l, 30 min
Test atmosphere: dust/mist

Primary skin irritation
hydrochloric acid … %
Species: rabbit
Result: Corrosive
Classification: Causes severe skin burns and eye damage (Skin Corr. 1B).
Method: OECD Test Guideline 404

Primary mucosae irritation
hydrochloric acid … %
Since this substance is already classified “corrosive”, the risk of serious damage to the eyes is implicit.

Sensitisation

hydrochloric acid … %
Skin sensitisation:

Classification: Does not cause skin sensitization.

Respiratory sensitization

No data available.

Subacute, subchronic and prolonged toxicity
hydrochloric acid … %
LOAEL (Lowest observable adverse effect level): 10 ppm
Application Route: Inhalative
Species: rat, male/female
Dose Levels: 0 - 10 - 20 - 50 ppm
Exposure duration: 90 d
Frequency of treatment: 6 hours a day, 5 days a week
Test substance: gas
Evidence of damage to organs other than the organs of respiration was not found.

LOAEL (Lowest observable adverse effect level): 10 ppm
Application Route: Inhalative
Species: Mouse, male/female
Dose Levels: 0 - 10 - 20 - 50 ppm
Exposure duration: 90 d
Frequency of treatment: 6 hours a day, 5 days a week
Test substance: gas
Evidence of damage to organs other than the organs of respiration was not found.

Carcinogenicity
hydrochloric acid … %
Species: rat, male
Application Route: Inhalative
Dose Levels: 10 ppm
Test substance: gas
Exposure duration: 128 w
Frequency of treatment: 6 hours/day, 5 days/week
Long-term tests did not reveal any indications of cancerogenic effects.

Reproductive toxicity/Fertility
hydrochloric acid … %
Available data show no indications for reproductive toxicity.

Reproductive toxicity/Developmental Toxicity/Teratogenicity
hydrochloric acid … %
No valid data available.

Genotoxicity in vitro
hydrochloric acid … %
Test type: Salmonella/microsome test (Ames test)
Metabolic activation: with/without
Result: No indication of mutagenic effects.

Genotoxicity in vivo
No data available.

STOT evaluation – one-time exposure
hydrochloric acid … %
Route of exposure: Inhalative
Target Organs: Respiratory system
May cause respiratory irritation.

STOT evaluation – repeated exposure
hydrochloric acid … %
Based on available data, the classification criteria are not met.

Aspiration toxicity

hydrochloric acid … %
Based on available data, the classification criteria are not met.

CMR Assessment
hydrochloric acid … %
Carcinogenicity: Based on available data, the classification criteria are not met.
Mutagenicity: Not mutagenic in Ames Test Based on available data, the classification criteria are not met.
Teratogenicity: Based on available data, the classification criteria are not met.
Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

Toxicology Assessment
hydrochloric acid … %
Acute effects: Causes severe skin burns and eye damage. Causes serious eye damage.
Sensitization: Based on available data, the classification criteria are not met.

11.2 Information on other hazards

No data available.

SECTION 12: Ecological information

Do not allow to escape into waterways, wastewater or soil.

Please find below the data available to us:

12.1 Toxicity

Acute Fish toxicity
hydrochloric acid … %
LC50 20.5 mg/l (pH 3,25 - 3,5)
Species: Lepomis macrochirus (Bluegill sunfish)
Exposure duration: 96 h
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Chronic Fish toxicity
hydrochloric acid … %

No data available.

Acute toxicity for daphnia
hydrochloric acid … %
EC50 0.45 mg/l (pH 4,92)
Species: Daphnia magna (Water flea)
Exposure duration: 48 h
Method: OECD Test Guideline 202
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Chronic toxicity to daphnia
hydrochloric acid … %
No data available.

Acute toxicity for algae
hydrochloric acid … %
ErC50 0.73 mg/l (pH 4,7)
Test type: static test
Species: Chlorella vulgaris (Fresh water algae)
Exposure duration: 72 h
Method: OECD Test Guideline 201
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Acute bacterial toxicity
hydrochloric acid … %
EC50 0.23 mg/l (pH 5,2)
Species: activated sludge
Method: OECD Test Guideline 209
Effect concentrations in the aquatic environment are attributable to a change in pH value.

Ecotoxicology Assessment
hydrochloric acid … %
Acute aquatic toxicity: Neutralisation will reduce ecotoxic effects.
Chronic aquatic toxicity: A chronic aquatic toxicity is not expected.
Toxicity Data on Soil: Not expected to adsorb on soil.
Impact on Sewage Treatment: Neutralization is normally necessary before waste water is discharged into water treatment plants.

12.2 Persistence and degradability

Biodegradability
hydrochloric acid … %
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

Bioaccumulation
hydrochloric acid … %
not applicable

12.4 Mobility in soil

Distribution among environmental compartments
hydrochloric acid … %
Adsorption/Soil
not applicable

Environmental distribution
hydrochloric acid … %
no data available

12.5 Results of PBT and vPvB assessment

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

12.6 Endocrine disrupting properties

No data available.

12.7 Other adverse effects

hydrochloric acid … %
Toxic effect on fish, plankton and on sedentary organisms, also through shifting of pH value. Causes no biological oxygen consumption. No inhibition of activity of waste bacteria after neutralization.

SECTION 13: Disposal considerations

Dispose in accordance with applicable international, national and local laws, ordinances and statutes. For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

13.1 Waste treatment methods

After containers have been emptied as thoroughly as possible (e.g. by pouring, scraping or draining until "drip-dry"), they can be sent to an appropriate collection point set up within the framework of the existing take-back scheme of the chemical industry. Containers must be recycled in compliance with national legislation and environmental regulations.

None disposal into waste water.

SECTION 14: Transport information

ADR/RID
14.1 UN number : 1789

14.2 UN proper shipping name	:	HYDROCHLORIC ACID
14.3 Transport hazard class(es)	:	8
Hazard Identification Number	:	80
14.4 Packing group	:	II
14.5 Environmental hazards	:	no

Limited quantity regulations applicable in accordance with chapter 3.4 ADR/RID in compliance with threshold value

ADN

14.1 UN number	:	1789
14.2 UN proper shipping name	:	HYDROCHLORIC ACID
14.3 Transport hazard class(es)	:	8
Hazard Identification Number	:	80
14.4 Packing group	:	II
14.5 Environmental hazards	:	no

ADN (tanker only)

14.1 UN number	:	1789
14.2 UN proper shipping name	:	HYDROCHLORIC ACID
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Environmental hazards	:	no

IATA

14.1 UN number	:	1789
14.2 UN proper shipping name	:	HYDROCHLORIC ACID
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Environmental hazards	:	no

IMDG

14.1 UN number	:	1789
14.2 UN proper shipping name	:	HYDROCHLORIC ACID
14.3 Transport hazard class(es)	:	8
14.4 Packing group	:	II
14.5 Marine pollutant	:	no
EmS Code	:	F-A - S-B
Segregation Group IMDG	:	1

14.6 Special precautions for user

See section 6 - 8.

Additional information	:	Corrosive, pungent smelling. Fuming. Keep away from foodstuffs, acids and alkalis.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Product name: HYDROCHLORIC ACID
Pollution category: Z - Ship type: 3

SECTION 15: Regulatory information

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

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
not applicable

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)
Conditions of restriction for the following entries should be considered: 3

Water contaminating class (Germany)
1 slightly water endangering
Classification according to AwSV, Annex 1 (5.2)

Any existing national regulations on the handling of irritant or corrosive substances must be observed.

Other regulations
Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical Safety Assessment

A Chemical Safety Assessment has been carried out for:
hydrochloric acid … %

SECTION 16: Other information

Full text of the hazard statements of the CLP classification (1272/2008/CE) referred to under sections 2, 3 and 10.

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.

Abbreviations and acronyms

ADN	Accord européen relatif au transport international des marchandises Dangereuses par voie de Navigation intérieure
ADR	Accord européen relatif au transport international des marchandises Dangereuses par Route
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials (US)
ATE	Acute Toxic Estimate
AwSv	Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen
BCF	Bioconcentration Factor
CAS	Chemical Abstract Service
CLP	Regulation on Classification, Labelling and Packaging of Substances and Mixtures
CMR	Cancerogenic Mutagenic Reprotoxic
DIN	Deutsches Institut für Normung
DNEL	Derived No-Effect Level
EC…	Effect Concentration ... %
EWC	European Waste Catalogue
IATA	International Air Transport Association
IBC	Intermediate Bulk Container
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
ISO	International Organization for Standardization
IUPAC	International Union of Pure and Applied Chemistry
LOAEL	Lowest Observable Adverse Effect Level
LC…	Lethal Concentration, ...%
LD…	Lethal Dose, ...%
MARPOL	International Convention for the Prevention of Pollution From Ships
NOAEL	No Observed Adverse Effect Level
NOEL/NOEC	No Observed Effect Level/Concentration
OECD	Organisation for Economic Co-operation and Development
PBT	persistent, bioaccumulative, toxic
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RID	Règlement concernant le transport International ferroviaire de marchandises Dangereuses
STOT	Specific Target Organ Toxicity
TRGS	Technische Regeln für Gefahrstoffe
vPvB	very Persistent, very Bioaccumulative
WGK	Wassergefährdungsklasse

Relevant changes since the last version are highlighted in the margin. This version replaces all previous

versions.

Further information
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Annex

Exposure Scenario

Number	Title
ES1	Use at industrial sites; Intermediate (PC19); Various sectors (SU0, SU4, SU8, SU9, SU11, SU12, SU13, SU19).
ES2	Formulation or re-packing; Various products (PC20, PC35, PC37); Industrial.
ES3	Formulation or re-packing; Various products (PC20, PC35, PC37); Professional.
ES4	Use at industrial sites; Various products (PC20, PC34, PC35, PC37); Various sectors (SU0, SU2a, SU2b, SU4, SU5, SU9, SU14, SU15, SU16).
ES5	Widespread use by professional workers; Various products (PC20, PC21, PC35, PC37); Various sectors (SU0, SU20, SU23).
ES6	Consumer use; Various products (PC20, PC21, PC35, PC37, PC38).

ES1: Use at industrial sites; Intermediate (PC19); Various sectors (SU0, SU4, SU8, SU9, SU11, SU12, SU13, SU19).

1.1. Title section

Exposure Scenario name	:	Use as an intermediate
Structured Short Title	:	Use at industrial sites; Intermediate (PC19); Various sectors (SU0, SU4, SU8, SU9, SU11, SU12, SU13, SU19).

Environment		
CS1	**Use as an intermediate**	ERC6a
Worker		
CS2	**Use as an intermediate**	PROC1
CS3	**Use as an intermediate**	PROC2
CS4	**Use as an intermediate**	PROC3
CS5	**Use as an intermediate**	PROC4
CS6	**Use as an intermediate**	PROC9
CS7	**Use as an intermediate**	PROC15
Further information		
Activities/processes covered within this scenario:, Use of HCl as an intermediate or process chemical or extraction agent. Includes recycling/recovery, material transfers, storage, sampling and associated laboratory activities.		

1.2. Conditions of use affecting exposure

1.2.1. Control of environmental exposure: Industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a)

Product (article) characteristics		
Vapour pressure	:	> 10 kPa at 20 °C , Highest concentration.
Amount used, frequency and duration of use (or from service life)		
Amounts used	:	
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year
Technical and organisational conditions and measures		
Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Prevent leaks and prevent soil / water pollution caused by leaks.		

Conditions and measures related to sewage treatment plant		
STP type	:	Onsite wastewater treatment required.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Indoor or outdoor use	:	Indoor/Outdoor use

1.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	All concentrations
Technical and organisational conditions and measures		
<= 25 % General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		

> 35 - < 40% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

1.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% ≤ 8 h/day General exposures		

Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use

Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

1.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 80 %		
OR ≤ 4 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35% General exposures Use in contained batch processes		

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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

1.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%

Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Batch process
Open systems
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 25 - ≤ 35%
General exposures
Batch process
Open systems
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 90 %

OR

≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

1.2.6. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		
> 25 - ≤ 35% General exposures Dedicated facility		

Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.

Other conditions affecting workers exposure		
Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

1.2.7. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		

> 25 - ≤ 35% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated differently).

1.3. Exposure estimation and reference to its source

1.3.1. Environmental release and exposure: Industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a)

Release route	Release rate	Release estimation method	Remarks
			Indoor/Outdoor use, Water-based process, Process optimized for

			efficient use of raw materials., Volatile compounds subject to air emission controls., Wastewater emissions generated from equipment cleaning with water.

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

1.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.01 ppm (ECETOC TRA v3.0)	0.002	All concentrations
inhalative, local, short-term	0.04 ppm (ECETOC TRA v3.0)	0.004	All concentrations
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%
inhalative, local, long-term	0.5 ppm (ECETOC TRA v3.0)	0.1	> 25 - ≤ 35%
inhalative, local, long-term	1.5 ppm (ECETOC TRA v3.0)	0.3	> 35 - < 40%
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	≤ 25%
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.2	> 25 - ≤ 35%
inhalative, local, short-term	6.0 ppm (ECETOC TRA v3.0)	0.6	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.60 ppm (ECETOC TRA v3.0)	0.12	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.8 ppm (ECETOC TRA v3.0)	0.36	≤ 25%, ≤ 4 h/day
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	> 25 - ≤ 35%
inhalative, local, long-term	1.5 ppm (ECETOC TRA v3.0)	0.3	> 35 - < 40%, ≤ 4 h/day
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.4 ppm (ECETOC TRA v3.0)	0.24	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	7.2 ppm (ECETOC TRA v3.0)	0.72	≤ 25%, ≤ 4 h/day
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	> 25 - ≤ 35%
inhalative, local, short-term	6.0 ppm (ECETOC TRA v3.0)	0.6	> 35 - < 40%, ≤ 4 h/day
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.5 ppm (ECETOC TRA v3.0)	0.1	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	2.0 ppm (ECETOC TRA v3.0)	0.4	> 25 - ≤ 35%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.2	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection
inhalative, local, long-term	2.0 ppm (ECETOC TRA v3.0)	0.4	> 35 - < 40%, ≤ 1 h/day, With Local exhaust ventilation (LEV)
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	8.0 ppm (ECETOC TRA v3.0)	0.8	> 25 - ≤ 35%

inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection
inhalative, local, short-term	8.0 ppm (ECETOC TRA v3.0)	0.8	> 35 - < 40%, ≤ 1 h/day, With Local exhaust ventilation (LEV)
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.6. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.5 ppm (ECETOC TRA v3.0)	0.1	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.5 ppm (ECETOC TRA v3.0)	0.1	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.5 ppm (ECETOC TRA v3.0)	0.3	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	2.0 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.4	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.2	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.0 ppm (ECETOC TRA v3.0)	0.6	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	8.0 ppm (ECETOC TRA v3.0)	0.8	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.3.7. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.0 ppm (ECETOC TRA	0.2	≤ 25%

	v3.0)		
inhalative, local, long-term	2.0 ppm (ECETOC TRA v3.0)	0.4	> 25 - ≤ 35%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.2	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.4	≤ 25%
inhalative, local, short-term	8.0 ppm (ECETOC TRA v3.0)	0.8	> 25 - ≤ 35%
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

1.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

ES2: Formulation or re-packing; Various products (PC20, PC35, PC37); Industrial.

2.1. Title section

Exposure Scenario name	:	Formulation & (re)packing of substances and mixtures, Industrial
Structured Short Title	:	Formulation or re-packing; Various products (PC20, PC35, PC37); Industrial.

Environment		
CS1	**Formulation & (re)packing of substances and mixtures, Industrial**	ERC2
Worker		
CS2	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC1
CS3	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC2
CS4	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC3
CS5	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC4
CS6	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC5
CS7	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC8a
CS8	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC8b
CS9	**Formulation & (re)packing of substances and mixtures, Industrial**	PROC9
Further information		
Activities/processes covered within this scenario:, Formulation, packing and re-packing of the substance (including drums and small packs) and his mixtures in batch or continuous operations, including storage, material transfers, mixing, large and small scale packing and sampling.		

2.2. Conditions of use affecting exposure

2.2.1. Control of environmental exposure: Formulation of preparations (ERC2)

Product (article) characteristics		
Vapour pressure	:	> 10 kPa at 20 °C , Highest concentration.
Amount used, frequency and duration of use (or from service life)		
Amounts used	:	
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year
Technical and organisational conditions and measures		
Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.		

Prevent leaks and prevent soil / water pollution caused by leaks.		
Conditions and measures related to sewage treatment plant		
STP type	:	Onsite wastewater treatment required.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Indoor or outdoor use	:	Indoor/Outdoor use

2.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	All concentrations
Technical and organisational conditions and measures		
<= 25 % General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system.		

Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Technical and organisational conditions and measures		

≤ 25% ≤ 8 h/day General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 80 %		
OR ≤ 4 h/day With Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35%		

General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %

Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		
> 25 - ≤ 35% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		

OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.6. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Product (article) characteristics

Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		
> 25 - ≤ 35% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.7. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		

> 25 - ≤ 35% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur.

Assumes a good basic standard of occupational hygiene is implemented.		
Other conditions affecting workers exposure		
Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.8. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Remarks	:	> 35 - < 40%, Vented cabin, AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV), AND, Without respiratory protection
Remarks	:	> 35 - < 40%, Vented cabin, OR, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		

OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV) AND Without respiratory protection
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20. Inhalation - minimum efficiency of 95 %

AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.

Other conditions affecting workers exposure		
Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

2.2.9. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With

		respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Dedicated facility
Drum and small package filling
Material transfers
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 25 - ≤ 35%
General exposures
Dedicated facility
Drum and small package filling
Material transfers
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 4 h/day
Wear a full face respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 95 %

OR
≤ 1 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extract ventilation to points where emissions occur.
Inhalation - minimum efficiency of 90 %

Recommendation:

Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated differently).

2.3. Exposure estimation and reference to its source

2.3.1. Environmental release and exposure: Formulation of preparations (ERC2)

Release route	Release rate	Release estimation method	Remarks
			Indoor/Outdoor use, Water-based process, Process optimized for efficient use of raw materials., Volatile compounds subject to air emission controls., Wastewater emissions

			generated from equipment cleaning with water.

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

2.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.01 ppm (ECETOC TRA v3.0)	0.002	All concentrations
inhalative, local, short-term	0.04 ppm (ECETOC TRA v3.0)	0.004	All concentrations
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	Exposure level	RCR	Remarks

inhalative, local, long-term	0.60 ppm (ECETOC TRA v3.0)	0.12	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.80 ppm (ECETOC TRA v3.0)	0.36	≤ 25%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.40 ppm (ECETOC TRA v3.0)	0.24	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	7.20 ppm (ECETOC TRA v3.0)	0.72	≤ 25%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day, With Local Exhaust Ventilation
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection
inhalative, local, short-term	8.00 ppm (ECETOC TRA	0.80	> 35 - < 40%, ≤ 1 h/day,

	v3.0)		With Local Exhaust Ventilation
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.6. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.7. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day

inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.25 ppm (ECETOC TRA v3.0)	0.25	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	5.00 ppm (ECETOC TRA v3.0)	0.50	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.8. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.25 ppm (ECETOC TRA v3.0)	0.05	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	0.45 ppm (ECETOC TRA v3.0)	0.09	> 35 - < 40%, ≤ 4 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	1.00 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	1.80 ppm (ECETOC TRA	0.18	> 35 - < 40%, ≤ 4 h/day

	v3.0)		
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.3.9. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

2.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

ES3: Formulation or re-packing; Various products (PC20, PC35, PC37); Professional.

3.1. Title section

Exposure Scenario name	:	Formulation & (re)packing of substances and mixtures, Professional
Structured Short Title	:	Formulation or re-packing; Various products (PC20, PC35, PC37); Professional.

Environment		
CS1	**Formulation & (re)packing of substances and mixtures, Professional**	ERC2
Worker		
CS2	**Formulation & (re)packing of substances and mixtures, Professional**	PROC1
CS3	**Formulation & (re)packing of substances and mixtures, Professional**	PROC2
CS4	**Formulation & (re)packing of substances and mixtures, Professional**	PROC3
CS5	**Formulation & (re)packing of substances and mixtures, Professional**	PROC4
CS6	**Formulation & (re)packing of substances and mixtures, Professional**	PROC5
CS7	**Formulation & (re)packing of substances and mixtures, Professional**	PROC8a
CS8	**Formulation & (re)packing of substances and mixtures, Professional**	PROC8b
CS9	**Formulation & (re)packing of substances and mixtures, Professional**	PROC9
Further information		
Activities/processes covered within this scenario:, Formulation, packing and re-packing of the substance (including drums and small packs) and his mixtures in batch or continuous operations, including storage, material transfers, mixing, large and small scale packing and sampling.		

3.2. Conditions of use affecting exposure

3.2.1. Control of environmental exposure: Formulation of preparations (ERC2)

Product (article) characteristics		
Vapour pressure	:	> 10 kPa at 20 °C , Highest concentration.
Amount used, frequency and duration of use (or from service life)		
Amounts used	:	
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year
Technical and organisational conditions and measures		
Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases.		

Prevent leaks and prevent soil / water pollution caused by leaks.		
Conditions and measures related to sewage treatment plant		
STP type	:	Onsite wastewater treatment required.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Indoor or outdoor use	:	Indoor/Outdoor use

3.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	All concentrations
Technical and organisational conditions and measures		
<= 25 % General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system.		

Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)

Remarks	: > 25 - ≤ 35%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %

Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection

Technical and organisational conditions and measures
≤ 25% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 4 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better.

Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Technical and organisational conditions and measures
≤ 25% General exposures Batch process

Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur.

Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.6. Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Technical and organisational conditions and measures		

≤ 25% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Mixing operations (open systems) Batch process 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %

AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.7. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures		

Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur.

Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.8. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40%

General exposures Dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.2.9. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Dedicated facility
Drum and small package filling
Material transfers
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

OR
≤ 1 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 25 - ≤ 35%
General exposures
Dedicated facility
Drum and small package filling
Material transfers
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Wear a full face respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 95 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 35 - < 40% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

3.3. Exposure estimation and reference to its source

3.3.1. Environmental release and exposure: Formulation of preparations (ERC2)

Release route	Release rate	Release estimation method	Remarks
			Indoor/Outdoor use, Water-based process, Process optimized for efficient use of raw materials., Volatile compounds subject to air emission controls., Wastewater emissions generated from equipment cleaning with water.

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

3.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.01 ppm (ECETOC TRA v3.0)	0.002	≤ 25%, > 25 - ≤ 35%
inhalative, local, long-term	0.10 ppm (ECETOC TRA v3.0)	0.02	> 35 - < 40%
inhalative, local, short-term	0.04 ppm (ECETOC TRA v3.0)	0.004	≤ 25%, > 25 - ≤ 35%
inhalative, local, short-term	0.40 ppm (ECETOC TRA v3.0)	0.04	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	0.80 ppm (ECETOC TRA v3.0)	0.16	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	3.20 ppm (ECETOC TRA v3.0)	0.32	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%, ≤ 4 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.60 ppm (ECETOC TRA v3.0)	0.12	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.80 ppm (ECETOC TRA v3.0)	0.36	≤ 25%, ≤ 4 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.40 ppm (ECETOC TRA v3.0)	0.24	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	7.20 ppm (ECETOC TRA v3.0)	0.72	≤ 25%, ≤ 4 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day

inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.6. Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5)

Exposure route	**Exposure level**	**RCR**	**Remarks**
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.7. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Exposure route	**Exposure level**	**RCR**	**Remarks**
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%

inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.8. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.3.9. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

3.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

ES4: Use at industrial sites; Various products (PC20, PC34, PC35, PC37); Various sectors (SU0, SU2a, SU2b, SU4, SU5, SU9, SU14, SU15, SU16).

4.1. Title section

Exposure Scenario name	:	End Use, Industrial
Structured Short Title	:	Use at industrial sites; Various products (PC20, PC34, PC35, PC37); Various sectors (SU0, SU2a, SU2b, SU4, SU5, SU9, SU14, SU15, SU16).

Environment		
CS1	**End Use, Industrial**	ERC4, ERC6b
Worker		
CS2	**End Use, Industrial**	PROC1
CS3	**End Use, Industrial**	PROC2
CS4	**End Use, Industrial**	PROC3
CS5	**End Use, Industrial**	PROC4
CS6	**End Use, Industrial**	PROC9
CS7	**End Use, Industrial**	PROC10
CS8	**End Use, Industrial**	PROC13
CS9	**End Use, Industrial**	PROC15
CS10	**End Use, Industrial**	PROC19
Further information		
Activities/processes covered within this scenario:, Covers the use in all kinds of applications of non-spraying formulations including material receipt, storage, preparation and transfer, application by roller and brush, wiping, dipping, equipment cleaning, maintenance and laboratory activities.		

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use of reactive processing aids (ERC6b)

Product (article) characteristics		
Vapour pressure	:	> 10 kPa at 20 °C , Highest concentration.
Amount used, frequency and duration of use (or from service life)		
Amounts used	:	
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year
Technical and organisational conditions and measures		

Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Prevent leaks and prevent soil / water pollution caused by leaks.		
Conditions and measures related to sewage treatment plant		
STP type	:	Onsite wastewater treatment required.
Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.
Other conditions affecting environmental exposure		
Indoor or outdoor use	:	Indoor/Outdoor use

4.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	All concentrations
Technical and organisational conditions and measures		
<= 25 % General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.		
> 25 - ≤ 35% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With

respiratory protection
Technical and organisational conditions and measures
≤ 25% ≤ 8 h/day General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Continuous process Automated process with (semi) closed systems. 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Provide extract ventilation to material transfer points and other openings. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training.

Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.		
Other conditions affecting workers exposure		
Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %		
OR ≤ 4 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system.		

Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures Use in contained batch processes 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), OR, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		
> 25 - ≤ 35% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 8 h/day Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated

differently).

4.2.6. Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance.		

Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Dedicated facility Drum and small package filling Material transfers 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately.

Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.7. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures.

≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.

Other conditions affecting workers exposure		
Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.8. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur.

Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately.

Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.2.9. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day

Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated differently).

4.2.10. Control of worker exposure: Hand-mixing with intimate contact and only PPE available (PROC19)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Technical and organisational conditions and measures		
≤ 25% General exposures Mixing operations (open systems) Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %		
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)		
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing. Stay upwind/keep distance from source.		
> 25 - ≤ 35% General exposures Mixing operations (open systems)		

Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
OR ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extract ventilation to points where emissions occur. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Stay upwind/keep distance from source.
> 35 - < 40% General exposures Mixing operations (open systems) Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 90 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure: Industrial use of processing aids in processes and products, not becoming part of articles (ERC4) / Industrial use of reactive processing aids (ERC6b)

Release route	Release rate	Release estimation method	Remarks
			Indoor/Outdoor use, Water-based process, Process optimized for efficient use of raw materials., Volatile compounds subject to air emission controls., Wastewater emissions generated from equipment cleaning with water.

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

4.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.01 ppm (ECETOC TRA v3.0)	0.002	All concentrations
inhalative, local, short-term	0.04 ppm (ECETOC TRA v3.0)	0.004	All concentrations
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%

inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.60 ppm (ECETOC TRA v3.0)	0.12	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.80 ppm (ECETOC TRA v3.0)	0.36	≤ 25%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.40 ppm (ECETOC TRA v3.0)	0.24	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	7.20 ppm (ECETOC TRA v3.0)	0.72	≤ 25%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection

inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day, With Local Exhaust Ventilation
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day, AND, ≤ 1 h/day, With respiratory protection
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%, ≤ 1 h/day, With Local Exhaust Ventilation
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.6. Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.7. Worker exposure: Roller application or brushing (PROC10)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.25 ppm (ECETOC TRA v3.0)	0.25	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.0 ppm (ECETOC TRA v3.0)	0.2	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	5.00 ppm (ECETOC TRA v3.0)	0.50	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.8. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.25 ppm (ECETOC TRA v3.0)	0.25	> 35 - < 40%

inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	5.00 ppm (ECETOC TRA v3.0)	0.50	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.9. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.0 ppm (ECETOC TRA v3.0)	0.2	≤ 25%
inhalative, local, long-term	2.0 ppm (ECETOC TRA v3.0)	0.4	> 25 - ≤ 35%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.2	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.4	≤ 25%
inhalative, local, short-term	8.0 ppm (ECETOC TRA v3.0)	0.8	> 25 - ≤ 35%
inhalative, local, short-term	4.0 ppm (ECETOC TRA v3.0)	0.4	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.3.10. Worker exposure: Hand-mixing with intimate contact and only PPE available (PROC19)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 1 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day

inhalative, local, long-term	1.25 ppm (ECETOC TRA v3.0)	0.25	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%, ≤ 1 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	5.0 ppm (ECETOC TRA v3.0)	0.50	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

4.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

ES5: Widespread use by professional workers; Various products (PC20, PC21, PC35, PC37); Various sectors (SU0, SU20, SU23).

5.1. Title section

Exposure Scenario name	:	End Use, Professional
Structured Short Title	:	Widespread use by professional workers; Various products (PC20, PC21, PC35, PC37); Various sectors (SU0, SU20, SU23).

Environment		
CS1	**End Use, Professional**	ERC8b, ERC8e
Worker		
CS2	**End Use, Professional**	PROC1
CS3	**End Use, Professional**	PROC2
CS4	**End Use, Professional**	PROC3
CS5	**End Use, Professional**	PROC4
CS6	**End Use, Professional**	PROC8a
CS7	**End Use, Professional**	PROC10
CS8	**End Use, Professional**	PROC11
CS9	**End Use, Professional**	PROC13
CS10	**End Use, Professional**	PROC15
CS11	**End Use, Professional**	PROC19
Further information		
Activities/processes covered within this scenario:, Covers the use of formulated spraying product including weighing, transfer operations and automated and manual spraying applications., Covers the use in all kinds of applications including material receipt, storage, preparation and transfer, application by roller and brush, wiping, dipping, spraying, equipment cleaning, maintenance and laboratory activities.		

5.2. Conditions of use affecting exposure

5.2.1. Control of environmental exposure: Wide dispersive indoor use of reactive substances in open systems (ERC8b) / Wide dispersive outdoor use of reactive substances in open systems (ERC8e)

Product (article) characteristics		
Vapour pressure	:	> 10 kPa at 20 °C , Highest concentration.
Amount used, frequency and duration of use (or from service life)		
Amounts used	:	
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year

Technical and organisational conditions and measures
Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk. Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic releases. Prevent leaks and prevent soil / water pollution caused by leaks.

Conditions and measures related to sewage treatment plant		
STP type	:	Onsite wastewater treatment required.

Conditions and measures related to treatment of waste (including article waste)		
Waste treatment	:	External treatment and disposal of waste should comply with applicable local and/or national regulations.

Other conditions affecting environmental exposure		
Indoor or outdoor use	:	Indoor/Outdoor use

5.2.2. Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	All concentrations

Technical and organisational conditions and measures
<= 25 % General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 25 - ≤ 35%

General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
> 35 - < 40% General exposures (closed systems) Continuous process 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. Ensure operatives are trained to minimise exposures.
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.3. Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection

Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures

≤ 25%
General exposures
Continuous process
Automated process with (semi) closed systems.
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Provide extract ventilation to material transfer points and other openings.
Inhalation - minimum efficiency of 80 %

OR
≤ 1 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Clear transfer lines prior to de-coupling.

> 25 - ≤ 35%
General exposures
Continuous process
Automated process with (semi) closed systems.
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Provide extract ventilation to material transfer points and other openings.
Inhalation - minimum efficiency of 80 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Clear transfer lines prior to de-coupling.

> 35 - < 40%
General exposures
Continuous process
Automated process with (semi) closed systems.
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Provide extract ventilation to material transfer points and other openings.

Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 4 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.4. Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day

Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Use in contained batch processes
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

OR
≤ 4 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Clear transfer lines prior to de-coupling.

> 25 - ≤ 35%
General exposures
Use in contained batch processes
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 4 h/day
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extract ventilation to points where emissions occur.
Inhalation - minimum efficiency of 80 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Clear transfer lines prior to de-coupling.

> 35 - < 40%
General exposures
Use in contained batch processes
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day

Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clear transfer lines prior to de-coupling.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.5. Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)

Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Batch process
Open systems
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

OR
≤ 1 h/day
Without Local exhaust ventilation (LEV)

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 25 - ≤ 35%
General exposures
Batch process
Open systems
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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 4 h/day
Wear a full face respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 95 %

OR
≤ 1 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extract ventilation to points where emissions occur.
Inhalation - minimum efficiency of 90 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 35 - < 40%

General exposures Batch process Open systems 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.6. Control of worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With

		respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Technical and organisational conditions and measures

≤ 25%
General exposures
Non-dedicated facility
Material transfers
Equipment cleaning and 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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 25 - ≤ 35%
General exposures
Non-dedicated facility
Material transfers
Equipment cleaning and 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.
Ensure operatives are trained to minimise exposures.

≤ 8 h/day
Ensure material transfers are under containment or extract ventilation.
Provide extraction ventilation at points where emissions occur.
Inhalation - minimum efficiency of 80 %

AND
Wear a half mask respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 90 %

OR
≤ 1 h/day
Wear a full face respirator conforming to EN140 with Type E filter or better.
Inhalation - minimum efficiency of 95 %

Recommendation:
Handle substance within a closed system.
Drain down and flush system prior to equipment break-in or maintenance.
Use bulk or semi-bulk handling systems.
Clean equipment and the work area every day.
Clear spills immediately.
Avoid splashing.

> 35 - < 40% General exposures Non-dedicated facility Material transfers Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.7. Control of worker exposure: Roller application or brushing (PROC10)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV), AND, With respiratory protection

Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Technical and organisational conditions and measures
≤ 25% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures (open systems) Rolling, Brushing Equipment cleaning and 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Use long handled tools. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.8. Control of worker exposure: Non industrial spraying (PROC11)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection

Technical and organisational conditions and measures
≤ 25% General exposures (open systems) Spraying 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures (open systems) Spraying 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures (open systems) Spraying 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system.

Drain down and flush system prior to equipment break-in or maintenance. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.9. Control of worker exposure: Treatment of articles by dipping and pouring (PROC13)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 4 hours/day
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	<= 25 %, Without Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With respiratory protection

Technical and organisational conditions and measures
≤ 25% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures.

≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures (open systems) Dipping, immersion and pouring 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. Ensure operatives are trained to minimise exposures. ≤ 4 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately.

Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure

Indoor or outdoor use	:	Indoor/Outdoor use
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

5.2.10. Control of worker exposure: Use as laboratory reagent (PROC15)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	≤ 25%, With Local exhaust ventilation (LEV)
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV)
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	≤ 25%, Without Local exhaust ventilation (LEV)
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV)

Technical and organisational conditions and measures
≤ 25% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
OR ≤ 1 h/day

Without Local exhaust ventilation (LEV)
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 25 - ≤ 35% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
> 35 - < 40% General exposures Laboratory activities Small scale Manual 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated differently).

5.2.11. Control of worker exposure: Hand-mixing with intimate contact and only PPE available (PROC19)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	0 - 40%
Vapour pressure	:	< 0.5 kPa at 20 °C , <= 25 %
Vapour pressure	:	0.5 - 10 kPa at 20 °C , > 25 - ≤ 35%
Vapour pressure	:	> 10 kPa at 20 °C , > 35 - < 40%
Physical form of product	:	Aqueous solution
Amount used, frequency and duration of use (or from service life)		
Amount per Application	:	
Remarks	:	Varies between milliliters (sampling) and cubic meters (material transfers).
Duration of the acitivity	:	<= 8 hours/day
Remarks	:	<= 25 %, With Local exhaust ventilation (LEV), AND, With respiratory protection
Remarks	:	> 25 - ≤ 35%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Duration of the acitivity	:	<= 1 hours/day
Remarks	:	> 25 - ≤ 35%, With respiratory protection
Remarks	:	> 35 - < 40%, With Local exhaust ventilation (LEV), AND, With respiratory protection
Technical and organisational conditions and measures		
≤ 25% General exposures Mixing operations (open systems) Manual 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. Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %		
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %		
Recommendation: Handle substance within a closed system. Drain down and flush system prior to equipment break-in or maintenance. Use bulk or semi-bulk handling systems. Clean equipment and the work area every day. Clear spills immediately. Avoid splashing.		
> 25 - ≤ 35% General exposures Mixing operations (open systems) Manual 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.		

Ensure operatives are trained to minimise exposures. ≤ 8 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a half mask respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 90 %
OR ≤ 1 h/day Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately. Stay upwind/keep distance from source.
> 35 - < 40% General exposures Mixing operations (open systems) Manual 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. Ensure operatives are trained to minimise exposures. ≤ 1 h/day Ensure material transfers are under containment or extract ventilation. Provide extraction ventilation at points where emissions occur. Inhalation - minimum efficiency of 80 %
AND Wear a full face respirator conforming to EN140 with Type E filter or better. Inhalation - minimum efficiency of 95 %
Recommendation: Handle substance within a closed system. Clean equipment and the work area every day. Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection. Wear chemically resistant gloves (tested to EN374) in combination with specific activity training. Wear respiratory protection where exposure to fumes may occur. Assumes a good basic standard of occupational hygiene is implemented.
Other conditions affecting workers exposure
Indoor or outdoor use : Indoor/Outdoor use
Remarks : Assumes activities are at ambient temperature (unless stated differently).

5.3. Exposure estimation and reference to its source

5.3.1. Environmental release and exposure: Wide dispersive indoor use of reactive substances in open systems (ERC8b) / Wide dispersive outdoor use of reactive substances in open systems (ERC8e)

Release route	Release rate	Release estimation method	Remarks

			Indoor/Outdoor use, Water-based process, Process optimized for efficient use of raw materials., Volatile compounds subject to air emission controls., Wastewater emissions generated from equipment cleaning with water.

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

5.3.2. Worker exposure: Use in closed process, no likelihood of exposure (PROC1)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.01 ppm (ECETOC TRA v3.0)	0.002	≤ 25%, > 25 - ≤ 35%
inhalative, local, long-term	0.10 ppm (ECETOC TRA v3.0)	0.02	> 35 - < 40%
inhalative, local, short-term	0.04 ppm (ECETOC TRA v3.0)	0.004	≤ 25%, > 25 - ≤ 35%
inhalative, local, short-term	0.40 ppm (ECETOC TRA v3.0)	0.04	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.3. Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC2)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	0.80 ppm (ECETOC TRA v3.0)	0.16	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%

inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	3.20 ppm (ECETOC TRA v3.0)	0.32	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%, ≤ 4 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.4. Worker exposure: Use in closed batch process (synthesis or formulation) (PROC3)

Exposure route	**Exposure level**	**RCR**	**Remarks**
inhalative, local, long-term	0.60 ppm (ECETOC TRA v3.0)	0.12	≤ 25%, ≤ 8 h/day
inhalative, local, long-term	1.80 ppm (ECETOC TRA v3.0)	0.36	≤ 25%, ≤ 4 h/day
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%, ≤ 1 h/day
inhalative, local, short-term	2.40 ppm (ECETOC TRA v3.0)	0.24	≤ 25%, ≤ 8 h/day
inhalative, local, short-term	7.20 ppm (ECETOC TRA v3.0)	0.72	≤ 25%, ≤ 4 h/day
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%, ≤ 1 h/day
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.

Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.5. Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 25 - ≤ 35%, ≤ 4 h/day
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.6. Worker exposure: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA	0.40	> 35 - < 40%

	v3.0)		
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.7. Worker exposure: Roller application or brushing (PROC10)

Exposure route	**Exposure level**	**RCR**	**Remarks**
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.8. Worker exposure: Non industrial spraying (PROC11)

Exposure route	**Exposure level**	**RCR**	**Remarks**
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.9. Worker exposure: Treatment of articles by dipping and pouring (PROC13)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.50 ppm (ECETOC TRA v3.0)	0.30	> 35 - < 40%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	6.00 ppm (ECETOC TRA v3.0)	0.60	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.10. Worker exposure: Use as laboratory reagent (PROC15)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.3.11. Worker exposure: Hand-mixing with intimate contact and only PPE available (PROC19)

Exposure route	Exposure level	RCR	Remarks
inhalative, local, long-term	0.50 ppm (ECETOC TRA v3.0)	0.10	≤ 25%
inhalative, local, long-term	2.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, long-term	1.00 ppm (ECETOC TRA v3.0)	0.20	> 35 - < 40%
inhalative, local, short-term	2.00 ppm (ECETOC TRA v3.0)	0.20	≤ 25%
inhalative, local, short-term	8.00 ppm (ECETOC TRA v3.0)	0.80	> 25 - ≤ 35%, ≤ 8 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 25 - ≤ 35%, ≤ 1 h/day
inhalative, local, short-term	4.00 ppm (ECETOC TRA v3.0)	0.40	> 35 - < 40%
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
All outdoor uses are covered by indoor uses. Therefore, only the RCRs for indoor uses were calculated.
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

5.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

ES6: Consumer use; Various products (PC20, PC21, PC35, PC37, PC38).

6.1. Title section

Exposure Scenario name	:	End Use, Consumer
Structured Short Title	:	Consumer use; Various products (PC20, PC21, PC35, PC37, PC38).

Environment		
CS1	**End Use, Consumer**	ERC8b, ERC8e
Consumer		
CS2	**End Use, Consumer**	PC20, PC21, PC35, PC37, PC38
Further information		
Activities/processes covered within this scenario:, Use of HCl solution at a maximum concentration of up to 20% for purposes as mentioned under the PCs above.		

6.2. Conditions of use affecting exposure

6.2.1. Control of environmental exposure: Wide dispersive indoor use of reactive substances in open systems (ERC8b) / Wide dispersive outdoor use of reactive substances in open systems (ERC8e)

Product (article) characteristics		
Vapour pressure	:	< 25 Pa
Amount used, frequency and duration of use (or from service life)		
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.
Emission days	:	360
Remarks	:	days/year
Technical and organisational conditions and measures		
Water Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.		

6.2.2. Control of consumer exposure: Products such as pH-regulators, flocculants, precipitants, neutralization agents (PC20) / Laboratory chemicals (PC21) / Washing and cleaning products (including solvent based products) (PC35) / Water treatment chemicals (PC37) / Welding and soldering products (with flux coatings or flux cores.), flux products (PC38)

Product (article) characteristics		
Concentration of the Substance in Mixture/Article	:	<= 20%
Vapour pressure	:	< 25 Pa at 20 °C
Physical form of product	:	Aqueous solution

Amount used, frequency and duration of use (or from service life)		
Amount used per event	:	0.5 l
Duration	:	Duration of the acitivity <= 4 h
Use frequency	:	daily
Conditions and measures related to personal protection, hygiene and health evaluation		
Consumer protection	:	Ensure good ventilation. Ensure doors and windows are opened. Clean equipment and the work area every day. Clean up contaminations as soon as they occur. Wear suitable gloves. Avoid contact with skin and eyes. Use suitable eye protection. Do not inhale fumes or aerosols that may evolve from using the product.
Other conditions affecting consumers exposure		
Remarks	:	Assumes activities are at ambient temperature (unless stated differently).

6.3. Exposure estimation and reference to its source

6.3.1. Environmental release and exposure: Wide dispersive indoor use of reactive substances in open systems (ERC8b) / Wide dispersive outdoor use of reactive substances in open systems (ERC8e)

Compartment	Exposure level	RCR	Remarks
All compartments	Not specified. (Qualitative assessment)		

Additional information on exposure estimation
No PNEC values are calculated for the substance. Substance will disassociate upon contact with water, the only effect is the pH effect therefore after passing through the STP exposure is considered negligible and with no risk.
Based on the applied RMMs the risk towards environment is sufficiently controlled.

6.3.2. Consumer exposure: Products such as pH-regulators, flocculants, precipitants, neutralization agents (PC20) / Laboratory chemicals (PC21) / Washing and cleaning products (including solvent based products) (PC35) / Water treatment chemicals (PC37) / Welding and soldering products (with flux coatings or flux cores.), flux products (PC38)

Value type	Exposure level	RCR	Remarks
inhalative, local, short-term	0.22 mg/m³ (Consexpo v4.1)	0.01	0,75 Min., Loading, AND, Mixing, 10 %, Hydrogen chloride, Vapour pressure, 0,12 Pa, AND, < 15 mins, Cleaning, 5 %
inhalative, local, short-term	1.30 mg/m³ (Consexpo v4.1)	0.08	0,75 Min., Loading, AND, Mixing, 15 %, Hydrogen chloride, Vapour pressure, 1,76 Pa, AND, < 15 mins, Cleaning, 5 %
inhalative, local, short-term	14.6 mg/m³ (Consexpo v4.1)	0.98	0,75 Min., Loading, AND, Mixing, 20 %, Hydrogen chloride, Vapour pressure,

			22 Pa, AND, < 15 mins, Cleaning, 5 %
inhalative, local, long-term	0.08 mg/m³ (Consexpo v4.1)	< 0.01	15 min, Loading, AND, Mixing, 20 %, Hydrogen chloride, Vapour pressure, 0,01 Pa, AND, 240 Min., Cleaning, 5 %
inhalative, local, long-term	1.36 mg/m³ (Consexpo v4.1)	0.17	15 min, Loading, AND, Mixing, 20 %, Hydrogen chloride, Vapour pressure, 0,12 Pa, AND, 240 Min., Cleaning, 10 %
dermal,	(Qualitative assessment)		Qualitative approach used to conclude safe use.

Additional information on exposure estimation
Based on the applied RMMs the risk towards humans is sufficiently controlled (RCR ≤ 1).

6.4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES

Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.