

SULPHURIC ACID 15-51%

Code : 16538

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

1.1. Product identifier

Chemical description : Sulphuric acid , Dihydrogen sulphate, solution (15-51%).
 Type of product : Pure product in solution .
 Reach registration number : 01-2119458838-20

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

- * Identified use(s) : See table on the front page of the annex.
- * Use(s) advised against : This product is not recommended for any industrial, professional or consumer use other than identified in table on the front page of the annex.

1.3. Details of the supplier of the safety data sheet

- * Company identification : BRENNTAG N.V. - Nijverheidslaan 38 - BE-8540 DEERLIJK
 TEL: +32(0)56/77.69.44 - FAX: +32(0)56/77.57.11
 E-MAIL: info@brenntag.be - Website: www.brenntag.be

 BRENNTAG Nederland B.V. - Donker Duyvisweg 44 - NL-3316 BM DORDRECHT
 TEL: +31(0)78/65.44.944 - FAX: +31(0)78/65.44.919
 E-MAIL: info@brenntag.nl - Website: www.brenntag.nl

1.4. Emergency telephone number

- * Emergency phone number : België : Antipoison Center - Brussels
 TEL: +32(0)70/245.245

 The Netherlands : National Poisoning Information Center - Bilthoven
 TEL: +31(0)30/274.88.88 (Only for the purpose of informing medical personnel in cases of acute intoxications)

SECTION 2. Hazards identification

2.1. Classification of the substance or mixture

Classification according to Directive 67/548/EEC or 1999/45/EC

Corrosive (C; R35)

Classification according to Regulation (EC) No 1272/2008

Skin corrosion - Category 1A - Danger (Skin Corr. 1A; H314)

2.2. Label elements

Label in accordance with Regulation (EC) No 1272/2008

- Dangerous ingredient(s) : Sulphuric acid ...%
- Hazard pictogram(s)



- Signal word : Danger
- Hazard statements : H314 - Causes severe skin burns and eye damage.
- Precautionary statements
 - Prevention : P260 - Do not breathe dust, fume, gas, mist, vapours, spray. P280 - Wear protective gloves, protective clothing, eye protection, face protection.
 - Response : P301+P330+P331 - IF SWALLOWED : Rinse mouth. Do NOT induce vomiting. P303+P361+P353 - IF ON SKIN (or hair) : Remove immediately all contaminated clothing. Rinse skin with water/shower. P305+P351+P338 - IF IN EYES : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P363 - Wash contaminated clothing before reuse.

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SECTION 2. Hazards identification (continued)

2.3. Other hazards

- Physical/chemical hazards : Attacks metals with liberation of hydrogen gas.
- Hazards for the health : A health dangerous concentration in the air will not or very slowly be reached by evaporation of this substance at app. 20°C; by spraying much faster.
- Hazards for the environment : Product causes a strong drop of the pH-value of water and soil.
This product is no substance or contains no PBT or vPvB (in accordance with Annex XIII).
- Hazards for the safety : Risk of explosion by many reactions.

SECTION 3. Composition/information on ingredients

3.1. Substances

Name component(s)	Weight %	CAS nr	EINECS nr	Index nr	Reach nr	CLASSIFICATION
Sulphuric acid ...%	: 15 -51 %	7664-93-9	231-639-5	016-020-00-8	01-2119458838-20	C; R35 ----- Skin Corr. 1A; H314

*

The full text of the R-phrases and (EU)H-statements is in section 16.

Note B (Regulation (EC) No 1272/2008) applies to the product or one or more of its components.

Note: SCL applicable

SECTION 4. First aid measures

4.1. Description of first aid measures

- General : CALL A PHYSICIAN IN ALL CIRCUMSTANCES.
Never give anything by mouth to an unconscious person.
- First Aid Measures
- Inhalation : Remove victim into fresh air.
Allow the affected person to rest in semi-sitting position.
If not breathing, give artificial respiration.
Take the patient to the hospital.
- Skin Contact : Remove contaminated clothing while rinsing.
Rinse skin immediately with plenty of water. (shower if necessary).
Consult a doctor.
- Eye Contact : Rinse IMMEDIATELY thoroughly and long (at least 15 min.) with plenty of water.
Remove contact lenses.
Consult eye doctor.
Keep rinsing or dripping the eye during transport.
- Ingestion : DO NOT INDUCE VOMITING. Rinse mouth with water.
Give victim plenty of water to drink.
Take the patient IMMEDIATELY to the hospital.

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

See section 11.

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

For specialist advice doctors should contact the NVCI or the Belgian Poison center.

SULPHURIC ACID 15-51%**Code : 16538****SECTION 5. Firefighting measures****5.1. Extinguishing media**

Extinguishing Media

- Suitable : Extinguishing powder , Alcohol resistant foam , Carbon dioxide (CO2) , Sand .
- Insuitable : Water .

5.2. Special hazards arising from the substance or mixture

Special Exposure Hazards : Fire may liberate toxic and corrosive sulfur oxides.

5.3. Advice for firefighters

- Special Protective Equipment for Firefighters : Use self-contained breathing apparatus and wear protective clothes when in close proximity to fire.
- Special Procedures : Apply water spray or fog to cool nearby equipment. Avoid fire-fighting water to enter environment.
Neutralize extinguishing water with a basic product.

SECTION 6. Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures**Personal Precautions : Evacuate all personnel immediately and ventilate area.
Avoid breathing vapour and contact with skin, eyes and clothing. Wear recommended personal protective equipment. (See section 8)**6.2. Environmental precautions**Environmental Precautions : Shut off leaks if without risks.
Dike in the spilled product as much as possible with inert material.
Prevent entry of product in public water, sewers or soil.
Notify authorities if liquid enters sewers or public waters.**6.3. Methods and material for containment and cleaning up**Methods for Cleaning Up : Collect the spillage in closable, corrosion resistant, suitable disposal containers.
Dilute spilled liquid immediately with plenty of water and neutralise with base. (e.g. Sodium bicarbonate)
Rinse abundantly with water.**6.4. Reference to other sections**For personal protection, see section 8.
For the removal of the waste product, see section 13.**SECTION 7. Handling and storage****7.1. Precautions for safe handling**

- * Handling : AVOID EVERY CONTACT !!
Avoid breathing vapour and contact with skin, eyes and clothing. Wear recommended personal protective equipment. (See section 8)
Avoid heating, splashing and formation of vapour when emptying, pouring, diluting or dissolving the product.
When diluting, always pour the acid solution upon the water, never the other way round.
When using, do not eat, drink or smoke.
Wash hands before and after working with the product.
Emergency eye wash fountains and showers should be available in the immediate vicinity of any potential exposure.

7.2. Conditions for safe storage, including any incompatibilities

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SECTION 7. Handling and storage (continued)

- Storage : Keep only in the original, safely locked container in a cool, well ventilated and dry place.
All dangerous products should be placed on a drip tray or should be barreled.
Keep away from : Bases , Reducing agents , Combustibles .
- Packaging Material : Polyethylene , Polypropylene , Glass .
- Insuitable Packaging Material : Metals .

7.3. Specific end use(s)

For identified uses, see subsection 1.2 and/or exposure scenarios.

SECTION 8. Exposure controls/personal protection

8.1. Control parameters

- * Occupational Exposure Limits : Sulphuric acid ...% : Limit value (BE) : 0,2 mg/m³ (2014) (Fog) (C)
Sulphuric acid ...% : Limit value (TWA 8 h) (NL) : 0,05 mg/m³ (2011)
(C) The mention "C" means that the involved agent concerns the field of application of the royal decree of December 2, 1993 concerning the protection of employees against the risks related to the exposure to carcinogenic and mutagen agents to work.
- Biological limit values : They will be included when available.
- DNELs : • Sulphuric acid ...% : Worker, acute - local effects, inhalation : 0,1 mg/m³
• Sulphuric acid ...% : Worker, long-term - local effects, inhalation : 0,05 mg/m³
- PNECs : • Sulphuric acid ...% : Intermittent release : -
• Sulphuric acid ...% : Sewage treatment plant : 8,8 mg/l
• Sulphuric acid ...% : Marine water sediment : 0,002 mg/l
• Sulphuric acid ...% : Fresh water sediment : 0,002 mg/l
• Sulphuric acid ...% : Marine water : 0,00025 mg/l
• Sulphuric acid ...% : Fresh water : 0,0025 mg/l
• Sulphuric acid ...% : Soil : -

8.2. Exposure controls

- Engineering Measures : Ventilation (If possible through the floor), Local exhaust .
- Personal Protection Equipment
- * - Respiratory protection : CE-approved mask for acid gases and vapours (type E, yellow).
- Skin protection : Suitable protective clothing (Acid proof) .
- * - Hand protection : Suitable material for safety gloves (EN 374):
The suitability of the gloves and the breakthrough time for a specific workplace should be discussed with the producers of the protective gloves.
- material : Viton
- thickness 0,7 mm
- breakthrough time : > 480'
- Eye/Face protection : Closed safety glasses or face shield.
- Environmental exposure controls : See sections 6, 7, 12 and 13.

SECTION 9. Physical and chemical properties

9.1. Information on basic physical and chemical properties

See technical data sheet for detailed information.

- Physical State (20°C) : Liquid .
- Form/Colour : Clear , Colourless .
- Odour : Odourless .

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- * Odour threshold : Not applicable.
- * pH value : < 1
- Melting/Freezing point : -50 to -35 °C
- Boiling Point/Range (1013 hPa) : 105 - 130 °C
- Flash point : Not applicable.
- Fire hazard : Not applicable.
- Evaporation rate : Not applicable.
- Explosion limits in air : Not applicable.
- Vapour pressure (20°C) : 0,5 - 2 kPa
- Relative density of saturated vapour/air mixture (air=1) : 1,0
- * Relative density (water=1) : 1,1 - 1,7
- Density (20°C) : 1,1 - 1,4 kg/l
- Solubility in water : Complete solubility .
- Soluble in : Diethyl ether .
- * Log P Octanol/Water (20°C) : 1 - 2,20 (estimated)
- Auto-ignition temperature : Not applicable.
- Minimum ignition energy : Not applicable.
- Decomposition temperature : No data available.
- Viscosity (20°C) : < 5 mPa.s (Dynamic)
- * Explosive properties : No chemical groups associated with explosive properties .
- * Oxidizing properties : No chemical groups associated with oxidizing properties .

9.2. Other information

Others : Very hygroscopic .

SECTION 10. Stability and reactivity**10.1. Reactivity**

Reactivity : The product is a strong oxidizer and reacts violently with combustibles and reducing agents.
Reacts violently with oxidizing agents and lyes.
Reacts with : Organic materials , Solvents .

10.2. Chemical stability

Stability : Unstable upon contact with moisture .

10.3. Possibility of hazardous reactions

Hazardous reactions : Exothermic reaction with: Water , Bases .
Contact with metallic substances may release inflammable hydrogen gas.

10.4. Conditions to avoid

Conditions to avoid : Heat sources .

10.5. Incompatible materials

- * Materials to avoid : Oxidizing agents , Bases , Reducing agents , Combustibles , Organic materials , Solvents , Metals .

10.6. Hazardous decomposition products

- * Hazardous Decomposition Products : Sulfur oxides , Hydrogen gas .

SULPHURIC ACID 15-51%**Code : 16538****SECTION 11. Toxicological information****11.1. Information on toxicological effects**

Acute toxicity	
* - Inhalation	: Symptoms include: • Sulphuric acid ...% : LC50 (Rat, inhalation, 4 h) : 0,375 mg/l (OECD Guideline 403) Sore throat, Cough, Shortness of breath, Difficulty in breathing .
* - Skin contact	: Symptoms include: Redness , Burning feeling . • Sulphuric acid ...% : LD50 (Rabbit, dermal) : No data available.
* - Ingestion	: Symptoms include: Irritation of lips, mouth and throat , Abdominal pain . • Sulphuric acid ...% : LD50 (Rat, oral) : 2140 mg/kg (OECD Guideline 401)
* Skin corrosion/irritation	: Causes severe burns.
* Serious eye damage/irritation	: Causes serious eye damage.
Aspiration hazard	: The product may affect the upper and lower airways, causing infections and impaired lung function.
Respiratory or skin sensitisation	: Probably not sensitive .
Carcinogenicity	: Not listed as carcinogenic . IARC : Group 1 (carcinogenic to humans)
Mutagenicity	: Not listed as mutagenic .
Reproductive toxicity	: Not listed for reproductive toxicity .
Specific target organ toxicity - single exposure	: To human : Listed not for organ toxicity . For animals : No effects known.
Specific target organ toxicity - repeated exposure	: To human : Listed not for organ toxicity . For animals : No effects known.

SECTION 12. Ecological information**12.1. Toxicity**

* Ecotoxicity	: • Sulphuric acid ...% : LC50 (Fish, 96 h) : 16 28 mg/l (Lepomis macrochirus) • Sulphuric acid ...% : EC50 (Algae, 72 h) : >100 mg/l (Desmodesmus subspicatus) (OECD Guideline 201) • Sulphuric acid ...% : EC50 (Daphnia magna, 48 h) : >100 mg/l (OECD Guideline 202)
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12.2. Persistence and degradability

Persistence and degradability	: • Sulphuric acid ...% : Persistence and degradability : Inorganic .
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12.3. Bioaccumulative potential

Bioaccumulation	: • Sulphuric acid ...% : Bioaccumulation : No bioaccumulation .
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12.4. Mobility in soil

* Mobility	: • Sulphuric acid ...% : Mobility : Hydrolysis .
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12.5. Results of PBT and vPvB assessment

Evaluation	: • Sulphuric acid ...% : PBT/vPvB : No
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12.6. Other adverse effects

Photochemical ozone creation potential	: No data available.
Ozone depletion potential	: None .
Endocrine disrupting potential	: No data available.
Global warming potential	: No data available.

SULPHURIC ACID 15-51%**Code : 16538****SECTION 13. Disposal considerations****13.1. Waste treatment methods**

- Waste from residues/Unused products : The product has to be destroyed according to national or local legislation, by a company specialised in handling hazardous waste products.
- European list of waste products : XXXXXX - European waste product code. This code is assigned on the basis of the most current applications and can not be representative for pollutions which are arisen at the effective use of the product. The producer of the waste has to evaluate its process himself and has to grant the appropriate waste coding. See Decision 2001/118/EC.
- Removal contaminated packaging : Packing is to be used exclusively for the packing of this product. After use, empty and close the packing very carefully. In case of returned packing, the empty packing can be offered back to the supplier.

SECTION 14. Transport information**14.1. UN number**

UN Number : 2796

14.2. UN proper shipping name

ADR/RID Name : UN 2796 Sulphuric acid, 8, II, (E)
ADN Name : UN 2796 Sulphuric acid , 8, II
IMDG Name : UN 2796 Sulphuric acid , 8, II
* IATA Name : UN 2796 Sulphuric acid , 8, II

14.3. Transport hazard classe(s)

Class : 8

14.4. Packing group

Packaging Group : II

14.5. Environmental hazards

Environmentally hazard : No
Marine pollutant : No

14.6. Special precautions for user

Danger number : 80
Hazard Label(s) : 8
EmS-N° : F-A , S-B

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Type ship : No data available.
Pollution category : No data available.

SECTION 15. Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture**

Inventories : Australian inventory (AICS): Listed in inventory.
Canadian inventory (DSL): Listed in inventory.
Chinese inventory (IECS): Listed in inventory.
European inventory (EINECS): Listed in inventory.
Korean inventory (KECI): Listed in inventory.
Inventory of the United States (TSCA): Listed in inventory.

NFPA n° : 3-0-2

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SECTION 15. Regulatory information (continued)

- * Relevant EU Rule(s) : Directive 98/24/EC of the Council of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work
 Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work
 Regulation (EC) No 273/2004 of the European Parliament and of the Council of 11 February 2004 on drug precursors
 Decision 2001/118/EC of the Commission of 16 January 2001 amending Decision 2000/532/EC as regards the list of wastes
 Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006
 Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (Reach)

- National regulations
 - Germany : WGK : 1
- * - Netherlands : Water damaging : 9
 Decontamination exertion : B
 SZW-list of carcinogenic substances : Sulphuric acid vapours

15.2. Chemical Safety Assessment

- * A chemical safety assessment has been carried out for the components that make up this material.

SECTION 16. Other information

This safety data sheet is exclusively made for industrial/professional use.
 This safety data sheet has been drawn up in accordance with Regulation (EU) No 453/2010.

* Has changed compared to previous revision.

- * Changes : Section 1 , Section 3 , Section 7 , Section 8 , Section 9 , Section 10 , Section 11 , Section 12 , Section 14 , Section 15 , Section 16 .
- Sources of used key data : The information contained herein is based on the present state of our knowledge (Producers of starting materials , Chemical cards , ...).
 See also on the webaddress:
<http://apps.echa.europa.eu/registered/registered-sub.aspx#search>
- R-phrase(s) : R35 - Causes severe burns.
- (EU)H-statement(s) : H314 - Causes severe skin burns and eye damage.
- * List of abbreviations and acronyms : ADN (Accord européen relatif au transport international des marchandises Dangereuses par voie de Navigation interieur) : European agreement concerning the international carriage of dangerous goods by inland waterways
 ADR (Accord européen relatif au transport international des marchandises Dangereuses par Route) : European agreement concerning the international carriage of dangerous goods by road
 DNEL (Derived No Effect Level) : an estimated safe exposure level
 EC50 : median Effective Concentration
 EmS (Emergency Schedule) : the first code refers to the relevant fire schedule and the second code refers to the relevant spillage schedule
 IARC (International Agency for Research on Cancer)
 IATA (International Air Transport Association) : provisions concerning the international carriage of dangerous goods by air
 IMDG (International Maritime Dangerous Goods code)
 LC50 : median Lethal Concentration
 LD50 : median Lethal Dose

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NFPA (National Fire Protection Association) or fire diamant
NOEC (No Observed Effect Concentration)
NVC1 : National Poisoning Information Center
OECD : Organisation for Economic Cooperation and Development
PBT : persistent, bioaccumulative and toxic
PNEC (Predicted No Effect Concentration) : concentration below which exposure to a substance is not expected to cause adverse effects
REACH : Registration, Evaluation, Authorisation and restriction of Chemicals
RID (Règlement concernant le transport International ferroviaire des marchandises Dangereuses) : Regulation concerning the International carriage of Dangerous goods by rail
SCL (Specific Concentration Limits)
Skin Corr. 1A : Skin corrosion - Category 1A
SZW-list : List of carcinogenic substances and processes as referred to in Article 4. 11 of the Working conditions decree
TWA (Time-Weighted Average) : the average exposure over a specified period
WGK (Wassergefährdungsklasse) : a German classification of substances that indicate the environmental hazard for surface water
vPvB : very persistent and very bioaccumulative

This information is to our knowledge correct and complete on the date of issue of this safety data sheet. The information only concerns the product and does not give any guarantee for the quality and the completeness of the properties of the product, or in case of mixing or using in any other process. It remains the responsibility of the user to assure himself that the information is suitable and complete concerning the special use he makes of the product.
BRENNTAG denies all responsibility for loss or damage resulting from the use of these data.

End of document

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

Sulphuric acid...%

Version 1.2

Print Date 31.01.2013

Revision Date 31.01.2013

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance	3	NA	NA	1, 2, 3, 4, 8a, 8b, 9	1	NA	ES529
2	Use as an intermediate	3	4, 6b, 8, 9, 14	19	1, 2, 3, 4, 8a, 8b, 9	6a	NA	ES679
3	Formulation & (re)packing of substances and mixtures	3	10	NA	1, 3, 5, 8a, 8b, 9	2	NA	ES689
4	Use in Cleaning Agents	22	NA	35	8a	8a	NA	ES904
5	Use in laboratories	22	NA	21	15	8a, 8b	NA	ES906
6	Use for extractions and processing of minerals, ores	3	2a, 14	20, 40	2, 3, 4	4, 6b	NA	ES784
7	Use as processing aid	3	4, 5, 6b, 8, 9, 11, 23	20	1, 2, 3, 4, 8a, 8b, 9, 13	6b	NA	ES782
8	Use in electrolytic processes	3	14, 15, 17	14, 20	1, 2, 8b, 9, 13	5, 6b	NA	ES788
9	Use in the process of surface treatments, purification and etching	3	2a, 14, 15, 16	14, 15	1, 2, 3, 4, 8a, 8b, 9, 13	6b	NA	ES786
10	Use in gas treatment	3	8	20	1, 2, 8b	7	NA	ES790
11	Use in production of sulphuric acid contained batteries	3	NA	NA	2, 3, 4, 9	2, 5	NA	ES792
12	Use in recycling of sulphuric acid contained batteries	3	NA	NA	2, 4, 5, 8a	1	NA	ES794
13	Use in maintenance of sulphuric acid contained batteries	22	NA	NA	19	8b, 9b	NA	ES798
14	Use of sulphuric acid contained batteries	21	NA	NA	NA	9b	3	ES1117

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1. Short title of Exposure Scenario 1: Manufacture of substance

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	<p>PROC1: Use in closed process, no likelihood of exposure</p> <p>PROC2: Use in closed, continuous process with occasional controlled exposure</p> <p>PROC3: Use in closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p>
Environmental Release Categories	ERC1: Manufacture of substances

2.1 Contributing scenario controlling environmental exposure for: ERC1

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 100%
Amount used	Annual amount per site	1,2 Million tonnes/year
	Annual amount used per region	19 Million tonnes/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4,

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PROC8a, PROC8b, PROC9

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 100%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems and closed nature of the production process	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

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EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,011µg/L	0,00440
ERC1	---	Marine water	PEC	0,0016µg/L	0,00640
ERC1	---	Fresh water sediment	PEC	0,97ng/kg	0,00049
ERC1	---	Marine sediment	PEC	0,14ng/kg	0,00007
ERC1	---	Soil	PEC	0,05µg/kg	---
ERC1	---	Air	PEC	0,18ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m3	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m3	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	14µg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	23µg/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	2,8µg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 2: Use as an intermediate

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU4: Manufacture of food products SU6b: Manufacture of pulp, paper and paper products SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals SU14: Manufacture of basic metals, including alloys
Chemical product category	PC19: Intermediate
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Environmental Release Categories	ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

2.1 Contributing scenario controlling environmental exposure for: ERC6a

Product characteristics	Concentration of the Substance in Mixture/Article	The substance is used up in the process
Amount used	Annual amount per site	300000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment

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Flow rate of sewage treatment plant effluent	2.000 m3/d
Sludge Treatment	Incineration or in a landfill

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

Product characteristics	Concentration of the Substance in Mixture/Article	The substance is used up in the process
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

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Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6a	---	Fresh water	PEC	0,2µg/L	0,08
ERC6a	---	Marine water	PEC	0,03µg/L	0,12
ERC6a	---	Fresh water sediment	PEC	0,0018µg/kg	0,0009
ERC6a	---	Marine sediment	PEC	0,0026µg/kg	0,0013
ERC6a	---	Soil	PEC	0,92µg/kg	---
ERC6a	---	Air	PEC	0,0032µg/m ³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m ³	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m ³	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	14µg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	23µg/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	2,8µg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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.
 Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management

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Measures/Operational Conditions outlined in Section 2 are implemented.
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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1. Short title of Exposure Scenario 3: Formulation & (re)packing of substances and mixtures

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU 10: Formulation [mixing] of preparations and/ or re-packaging (excluding alloys)
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC3: Use in closed batch process (synthesis or formulation) PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Environmental Release Categories	ERC2: Formulation of preparations

2.1 Contributing scenario controlling environmental exposure for: ERC2

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	300000 ton(s)/year
	Annual amount used per region	3 Million tonnes/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

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2.2 Contributing scenario controlling worker exposure for: PROC1, PROC3, PROC5, PROC8a, PROC8b, PROC9

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3)	
	Indoors, any sized room, with good natural ventilation(PROC5, PROC9)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC3)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC5)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC3, PROC5, PROC8b)	
	Complete segregation(PROC1)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	---	Fresh water	PEC	0,0443µg/L	0,01772
ERC2	---	Marine water	PEC	0,0064µg/L	0,02568
ERC2	---	Fresh water sediment	PEC	0,0038µg/kg	0,00192
ERC2	---	Marine sediment	PEC	0,0005µg/kg	0,00028
ERC2	---	Soil	PEC	0,2µg/kg	---
ERC2	---	Air	PEC	0,0007µg/m ³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0009ng/m ³	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC5	90th percentile value	worker inhalation, long term - systemic	0,016mg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	0,023mg/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0004µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	0,0028mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 4: Use in Cleaning Agents

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Chemical product category	PC35: Washing and cleaning products (including solvent based products)
Process categories	PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems

2.1 Contributing scenario controlling environmental exposure for: ERC8a

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	1 kg
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	None (emissions to drains)
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Amount of substance in waste resulting from service life of articles:; Not applicable.
	Waste treatment	Release fraction to air from waste handling:; Not applicable.
	Waste treatment	Release fraction to wastewater from waste handling:; Not applicable.
	Waste treatment	Fraction disposed of as secondary waste:; Not applicable.

2.2 Contributing scenario controlling worker exposure for:PROC8a

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per	480 min

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	day	
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m ³ /day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	LEV not required	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
Conditions and measures related to personal protection, hygiene and health evaluation	Only basic skin protection is required	
	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Workers

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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.

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 2 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

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1. Short title of Exposure Scenario 5: Use in laboratories

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Chemical product category	PC21: Laboratory chemicals
Process categories	PROC15: Use as laboratory reagent
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	5000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for:PROC15

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	

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Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation
	Due to the nature of the substance the process should be kept as contained as possible
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance
	Substance-handling procedures shall be well documented and strictly supervised
Conditions and measures related to personal protection, hygiene and health evaluation	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8a	---	Fresh water	PEC	0,138µg/L	0,05520
ERC8a	---	Marine water	PEC	0,0074µg/L	0,02956
ERC8a	---	Fresh water sediment	PEC	0,011µg/kg	0,00580
ERC8a	---	Marine sediment	PEC	0,639ng/kg	0,00032
ERC8a	---	Soil	PEC	0,134µg/kg	---
ERC8a	---	Air	PEC	0,48ng/m3	---
ERC8b	---	Fresh water	PEC	2,12ng/L	0,00085
ERC8b	---	Marine water	PEC	0,0666ng/L	0,00026
ERC8b	---	Fresh water sediment	PEC	0,183ng/kg	0,00009
ERC8b	---	Marine sediment	PEC	0,0058ng/kg	0,00000
ERC8b	---	Soil	PEC	0,134ng/kg	---
ERC8b	---	Air	PEC	0,0048ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC15	90th percentile value	worker inhalation, long term - systemic	0,023µg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 6: Use for extractions and processing of minerals, ores

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU2a: Mining (without offshore industries) SU14: Manufacture of basic metals, including alloys
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents PC40: Extraction agents
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC6b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	438 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Metal recovery, incineration or landfill

2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Frequency of use	220 days/year

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	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m ³ /day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC2)	
	Outdoors near to buildings(PROC3, PROC4)	
	Process may involve high temperature (50 - 150°C)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(PROC2, PROC4)	
	Provide local exhaust ventilation (LEV).(PROC2)	
	Complete segregation(PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	---	Fresh water	PEC	0,025µg/L	0,01000
ERC4	---	Marine water	PEC	0,0036µg/L	0,01424
ERC4	---	Fresh water sediment	PEC	0,0021µg/kg	0,00106
ERC4	---	Marine sediment	PEC	0,0003µg/kg	0,00015
ERC4	---	Soil	PEC	0,112µg/kg	---
ERC4	---	Air	PEC	0,0004µg/m ³	---
ERC6b	---	Fresh water	PEC	0,026ng/L	0,00001
ERC6b	---	Marine water	PEC	0,0037ng/L	0,00001

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ERC6b	---	Fresh water sediment	PEC	0,0000µg/kg	0,00000
ERC6b	---	Marine sediment	PEC	0,0000µg/kg	0,00000
ERC6b	---	Soil	PEC	0,0001µg/kg	---
ERC6b	---	Air	PEC	0,0000µg/m ³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m ³	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	0,014mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 7: Use as processing aid

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU4: Manufacture of food products SU5: Manufacture of textiles, leather, fur SU6b: Manufacture of pulp, paper and paper products SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals SU11: Manufacture of rubber products SU23: Electricity, steam, gas water supply and sewage treatment
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC6b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	100000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to	Air	Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation
	Water	The wastewater neutralisation process is extremely efficient with almost total neutralisation achieved

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prevent/limit release from the site

Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	On-site waste water treatment
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC13

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa

Amount used
Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.

Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	

Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	

Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	

Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a, PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC2, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	

Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	

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

Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6b	---	Fresh water	PEC	0,0059µg/L	0,00236
ERC6b	---	Marine water	PEC	0,0009µg/L	0,00344
ERC6b	---	Fresh water sediment	PEC	0,0005µg/kg	0,00026
ERC6b	---	Marine sediment	PEC	0,074ng/kg	0,00004
ERC6b	---	Soil	PEC	0,027µg/kg	---
ERC6b	---	Air	PEC	0,0000µg/m ³	---

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m ³	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m ³	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	0,014mg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	0,023mg/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	0,0028mg/m ³	---
PROC13	90th percentile value	worker inhalation, long term - systemic	0,016mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 8: Use in electrolytic processes

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU14: Manufacture of basic metals, including alloys SU15: Manufacture of fabricated metal products, except machinery and equipment SU17: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment
Chemical product category	PC14: Metal surface treatment products, including galvanic and electroplating products PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC5, ERC6b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 95-98%
Amount used	Annual amount per site	2306 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Metal recovery, incineration or landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8b, PROC9, PROC13

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 95-98%
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	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC1, PROC2)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	
	Wear respiratory protection (Efficiency: 90 %)(PROC13)	

3. Exposure estimation and reference to its source

Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC5	---	Fresh water	PEC	0,0681 µg/L	0,02724
ERC5	---	Marine water	PEC	0,0099 µg/L	0,03948
ERC5	---	Fresh water sediment	PEC	0,0059 µg/kg	0,00294

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ERC5	---	Marine sediment	PEC	0,0008µg/kg	0,00043
ERC5	---	Soil	PEC	0,309µg/kg	---
ERC5	---	Air	PEC	0,0011µg/m ³	---
ERC6b	---	Fresh water	PEC	0,136ng/L	0,00005
ERC6b	---	Marine water	PEC	0,0197ng/L	0,00008
ERC6b	---	Fresh water sediment	PEC	0,0118ng/kg	0,00001
ERC6b	---	Marine sediment	PEC	0,0017ng/kg	0,00000
ERC6b	---	Soil	PEC	0,618ng/kg	---
ERC6b	---	Air	PEC	0,0022ng/m ³	---

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m ³	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	0,0028mg/m ³	---
PROC13	90th percentile value	worker inhalation, long term - systemic	0,47mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 9: Use in the process of surface treatments, purification and etching

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU2a: Mining (without offshore industries) SU14: Manufacture of basic metals, including alloys SU15: Manufacture of fabricated metal products, except machinery and equipment SU16: Manufacture of computer, electronic and optical products, electrical equipment
Chemical product category	PC14: Metal surface treatment products, including galvanic and electroplating products PC15: Non-metal-surface treatment products
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC6b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	10000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

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2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9, PROC13

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems and closed nature of the production process	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings(PROC1, PROC2, PROC8a, PROC8b)	
	Outdoors near to buildings(PROC3, PROC4)	
	Indoors, any sized room, with good natural ventilation(PROC9, PROC13)	
	Process may involve high temperature (50 - 150°C)(PROC C1, PROC2, PROC3, PROC4)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system(except PROC8a, PROC13)	
	Provide local exhaust ventilation (LEV).(PROC1, PROC2, PROC3, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

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Environment

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Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC6b	---	Fresh water	PEC	0,591ng/L	0,00024
ERC6b	---	Marine water	PEC	0,0856ng/L	0,00034
ERC6b	---	Fresh water sediment	PEC	0,051ng/kg	0,00003
ERC6b	---	Marine sediment	PEC	0,0074ng/kg	0,00000
ERC6b	---	Soil	PEC	2,68ng/kg	---
ERC6b	---	Air	PEC	0,0096ng/m3	---

Workers

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m3	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,0920ng/m3	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,42µg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	0,014mg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	0,023mg/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	0,0028mg/m ³	---
PROC13	90th percentile value	worker inhalation, long term - systemic	0,016mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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.

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

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1. Short title of Exposure Scenario 10: Use in gas treatment

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)
Chemical product category	PC20: Products such as ph-regulators, flocculants, precipitants, neutralization agents
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities
Environmental Release Categories	ERC7: Industrial use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC7

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	30000 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Technical conditions and measures at process level (source) to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Spent acid solutions are neutralized to circumneutral pH prior to discharge
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid

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	Vapour pressure	0,06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Outdoors not close to buildings	
	Process may involve high temperature (50 - 150°C)	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Use vapour recovery system	
	Provide local exhaust ventilation (LEV).(PROC1, PROC8b)	
	Complete segregation(PROC1, PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC7	---	Fresh water	PEC	0,0886µg/L	0,03544
ERC7	---	Marine water	PEC	0,0128µg/L	0,05120
ERC7	---	Fresh water sediment	PEC	0,0076µg/kg	0,00383
ERC7	---	Marine sediment	PEC	0,0011µg/kg	0,00056
ERC7	---	Soil	PEC	0,0029mg/kg	---
ERC7	---	Air	PEC	0,0014µg/m ³	---

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1	90th percentile value	worker inhalation, long term - systemic	0,0094ng/m ³	---
PROC2	90th percentile value	worker inhalation, long term - systemic	0,092ng/m ³	---
PROC8b	90th percentile value	worker inhalation, long term - systemic	0,0048µg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 11: Use in production of sulphuric acid contained batteries

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)
Environmental Release Categories	ERC2: Formulation of preparations ERC5: Industrial use resulting in inclusion into or onto a matrix

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC5

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3, PROC4, PROC9

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 98%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure should be low and controlled	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²

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Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases

Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.
	Due to the nature of the substance the process should be kept as contained as possible
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance Substance-handling procedures shall be well documented and strictly supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	---	Fresh water	PEC	0,0369µg/L	0,01476
ERC2	---	Marine water	PEC	0,0054µg/L	0,02144
ERC2	---	Fresh water sediment	PEC	0,0032µg/kg	0,00160
ERC2	---	Marine sediment	PEC	0,0005µg/kg	0,00023
ERC2	---	Soil	PEC	0,166µg/kg	---
ERC2	---	Air	PEC	0,0006µg/m ³	---
ERC5	---	Fresh water	PEC	0,0788µg/L	0,03152
ERC5	---	Marine water	PEC	0,0107µg/L	0,04280
ERC5	---	Fresh water sediment	PEC	0,0064µg/kg	0,00319
ERC5	---	Marine sediment	PEC	0,0009µg/kg	0,00046
ERC5	---	Soil	PEC	0,335µg/kg	---
ERC5	---	Air	PEC	0,0012µg/m ³	---

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Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	worker inhalation, long term - systemic	1,4µg/m ³	---
PROC3	90th percentile value	worker inhalation, long term - systemic	0,014mg/m ³	---
PROC4	90th percentile value	worker inhalation, long term - systemic	0,0012mg/m ³	---
PROC9	90th percentile value	worker inhalation, long term - systemic	0,0012mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 12: Use in recycling of sulphuric acid contained batteries

Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities
Environmental Release Categories	ERC1: Manufacture of substances

2.1 Contributing scenario controlling environmental exposure for: ERC1

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC2, PROC4, PROC5, PROC8a

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
	Physical Form (at time of use)	liquid
	Vapour pressure	0,06 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day

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	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	
	Room size and ventilation rate are not relevant as workers work in a control room, with no direct contact to the installations housing the material.	
	Due to the nature of the substance the process should be kept as contained as possible	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).	
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance	
	Substance-handling procedures shall be well documented and strictly supervised	
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks	
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)	

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water	PEC	0,0074µg/L	0,00295
ERC1	---	Marine water	PEC	0,0011µg/L	0,00428
ERC1	---	Fresh water sediment	PEC	0,0638ng/kg	0,00032
ERC1	---	Marine sediment	PEC	0,0093ng/kg	0,00005
ERC1	---	Soil	PEC	0,0335µg/kg	---
ERC1	---	Air	PEC	0,0001µg/m ³	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2	90th percentile value	worker inhalation, long term - systemic	0,0012mg/m ³	---
PROC4	90th percentile value	worker inhalation, long	0,004mg/m ³	---

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		term - systemic		
PROC5	90th percentile value	worker inhalation, long term - systemic	0,013mg/m ³	---
PROC8a	90th percentile value	worker inhalation, long term - systemic	0,006mg/m ³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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

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1. Short title of Exposure Scenario 13: Use in maintenance of sulphuric acid contained batteries

Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process categories	PROC19: Hand-mixing with intimate contact and only PPE available
Environmental Release Categories	ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC9b: Wide dispersive outdoor use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC8b, ERC9b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
	Physical Form (at time of use)	liquid
	Vapour pressure	2,14 hPa
Amount used	Worker exposure considered to be negligible due to the specialized systems.	
Frequency and duration of use	Frequency of use	220 days/year
	Exposure duration per day	480 min
	Intermittent contact is expected	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
	Please note that due to the corrosive nature of the substance dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases	
Other operational conditions affecting workers exposure	Indoors, any sized room, with good natural ventilation	

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	Due to the nature of the substance the process should be kept as contained as possible
Organisational measures to prevent /limit releases, dispersion and exposure	Only properly trained and authorised personal shall handle the substance
	Substance-handling procedures shall be well documented and strictly supervised
	Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimize exposure and risks
Conditions and measures related to personal protection, hygiene and health evaluation	Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves, boots and protective coverall)

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8b	---	Fresh water	PEC	0,001µg/L	0,00424
ERC8b	---	Marine water	PEC	0,333ng/L	0,00133
ERC8b	---	Fresh water sediment	PEC	0,914ng/kg	0,00046
ERC8b	---	Marine sediment	PEC	0,0288ng/kg	0,00001
ERC8b	---	Soil	PEC	0,671ng/kg	---
ERC8b	---	Air	PEC	0,002ng/m3	---
ERC9b	---	Fresh water	PEC	0,003µg/L	0,01340
ERC9b	---	Marine water	PEC	1,85ng/L	0,00740
ERC9b	---	Fresh water sediment	PEC	2,89ng/kg	0,00140
ERC9b	---	Marine sediment	PEC	0,16ng/kg	0,00008
ERC9b	---	Soil	PEC	0,003µg/kg	---
ERC9b	---	Air	PEC	0,12ng/m3	---

Workers

Advanced REACH Tool (ART model)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
---	90th percentile value	worker inhalation, long term - systemic	0,002mg/m³	---

The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for the risk characterisation purposes

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

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Exposure Scenario

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.
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1. Short title of Exposure Scenario 14: Use of sulphuric acid contained batteries

Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)
Article categories	AC3: Electrical batteries and accumulators
Environmental Release Categories	ERC9b: Wide dispersive outdoor use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC9b

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
Amount used	Annual amount per site	2500 ton(s)/year
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Flow rate of receiving surface water	18.000 m3/d
	Dilution Factor (River)	10
	Dilution Factor (Coastal Areas)	100
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2.000 m3/d
	Sludge Treatment	Incineration or in a landfill

2.2 Contributing scenario controlling consumer exposure for:AC3

Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product: 25% - 40%
	Physical Form (at time of use)	liquid
	Vapour pressure	< 0,1 hPa
Frequency and duration of use	Exposure duration per day	240 min
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Exposed skin surface	480 cm ²
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Batteries should only be opened in a well-ventilated place
	Consumer Measures	Batteries should not be opened unnecessarily
	Consumer Measures	Batteries should stand on firm ground to prevent spill
	Consumer Measures	Wear suitable coveralls to prevent exposure to the skin.
	Consumer Measures	Wear acid-resistant gloves

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Consumer Measures

Wear protective eye glasses for protection against liquid splashes.

3. Exposure estimation and reference to its source

Environment

EUSES V2.1 tier 2

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC9b	---	Fresh water	PEC	0,0335µg/L	0,0134
ERC9b	---	Marine water	PEC	0,0018µg/L	0,0074
ERC9b	---	Fresh water sediment	PEC	2,89ng/kg	0,0014
ERC9b	---	Marine sediment	PEC	0,16ng/kg	0,0001
ERC9b	---	Soil	PEC	33,5ng/kg	---
ERC9b	---	Air	PEC	0,12ng/m3	---

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

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