

## SULFURIC ACID 98%

|                |            |              |           |               |                   |
|----------------|------------|--------------|-----------|---------------|-------------------|
| UPDATING DATE: | 15/01/2021 | PREPARED BY: | ICARO Srl | ON BEHALF OF: | NUOVA SOLMINE SpA |
|----------------|------------|--------------|-----------|---------------|-------------------|

### SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

#### 1.1 Product identifier

|                     |                                |
|---------------------|--------------------------------|
| Product name:       | Sulfuric acid                  |
| Synonym:            | Oil of vitriol                 |
| CAS Number          | 7664-93-9                      |
| EC Number           | 231-639-5                      |
| Index number        | 016-020-00-8                   |
| Registration number | 01-2119458838-20-0087          |
| Chemical formula    | H <sub>2</sub> SO <sub>4</sub> |

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

**Relevant identified uses:** Its production is one of the highest in the chemical industry. Its main use (about 60% of the total) in the fertilizer industry. It is also used in petroleum refinery, petrochemical processes, production of inorganic pigments such as titanium dioxide (TiO<sub>2</sub>), etc. in metallurgy.

*Identified uses in the chemical safety report:*

- Manufacturing: production of the substance
- Formulation and repackaging: mixing, preparation and repackaging
- Use on industrial sites: as an intermediate in the production of organic and inorganic chemicals including fertilizers, as a catalyst, desiccant, pH regulator, extraction and treatment of minerals, in surface treatment, purification and cleaning processes. chemical attack, gas cleaning, production and recycling of batteries containing sulfuric acid, industrial cleaning,
- Professional use: maintenance of batteries containing sulfuric acid, such as laboratory chemicals, when cleaning drains
- General public use: batteries containing sulfuric acid, for cleaning drains

See section 16 for a complete list of applications for which there is an exposure scenario ES attached to this MSDS

**Uses advised against:** None known

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

|                             |  |
|-----------------------------|--|
| Company name                | NUOVA SOLMINE S.p.A.   |
| Address                     | Stabilimento di Scarlino, Loc. Casone                            |
| City / State                | 58020 Scarlino (GR)  |
| Telephone                   | Tel. +39 0566 70111  |
| Competent Technician E-mail | <a href="mailto:segreteria@solmine.it">segreteria@solmine.it</a> |

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### 1.4 Emergency telephone number

Italy - Poisons Information (h24)

Ospedale Niguarda Milano Tel: +39 02 66101029

CAV Pavia: Tel.+39 0382/24444

CAV Bergamo: Tel: +39 800 883300

CAV Foggia: Tel +39 0881-732326

CAV Firenze: Tel +39 055-7947819

CAV Policlinico Umberto I Roma: Tel +39 06-490663

CAV Policlinico "A.Gemelli": Tel +39 06-3054343

CAV Cardarelli Napoli: Tel: +39 081-5453333/7472870

*Foreign countries:* Contact the closest Poisons Information Centre.

## SECTION 2. HAZARDS IDENTIFICATION

### 2.1 Classification of the substance or mixture

Skin Corr 1A ; H314

See section 16 for the list of the extended hazard statements.

### 2.2 Label elements



GHS05

Signal Word: Dangerous

Hazard Statement: H314 Causes severe skin burns and eye damage.

Precautionary Statement *Prevention*

P280: Wear protective gloves/protective clothing/eye protection/face protection

*Reaction*

P310: Immediately call a POISON CENTER or doctor/physician.

P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P303 + P361 + P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.

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### Conservation

P405: Store locked up.

**Other information:** n.a.

### 2.3 Other hazards

Highly water reactive. Never add water to the product.

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

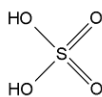
| Name          | Concentration % | n.CAS     | n.CE      | Index n.                 | Registration number   | Classification according to Regulation (CE) 1272/2008 (CLP) |
|---------------|-----------------|-----------|-----------|--------------------------|-----------------------|---|
| Sulfuric acid | 98%             | 7664-93-9 | 231-639-5 | 016-020-00-8<br>(Note B) | 01-2119458838-20-0087 | Skin Corr 1A; H314  |

See section 16 for the list of the extended hazard statements.

Chemical formula

H<sub>2</sub>SO<sub>4</sub>

Chemical structure



Molecular weight

98.08

### 3.2 Mixtures

n.a.

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### SECTION 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

|               |   |
|---------------|---|
| Eye contact:  | Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Seek immediate medical attention.  |
| Skin contact: | Get medical attention immediately. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.  |
| Swallowing:   | Wash out mouth with water. In the event of swallowing, induce patient to drink plenty of water. Get medical attention immediately   |
| Inhalation:   | Get medical attention immediately. Move exposed person to fresh air. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Keep person warm and at rest. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. |

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

The product seriously damages mucous membranes and upper respiratory tract, not only but also eyes and skin. Symptoms are: cough, shortness of breath, headache, nausea. After ingestion: hard pain (risk of stomach perforation!), nausea, vomiting and diarrhea. After a latency period of several weeks possibly pyloric stenosis.

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

Seek immediately medical attention in all cases of exposure.

### SECTION 5. FIREFIGHTING MEASURES

#### 5.1 Extinguishing media

*Suitable extinguishing media:* The product is not flammable. Consider materials in the surrounding.

*Unsuitable extinguishing media:* in case of fire with spilled product does not use water.

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

Decomposition products may include sulfur oxides.

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### 5.3 Advice for firefighters

Do not enter the water in the containers. Provide the emergency workers of appropriate protective clothing and breathing apparatus (SCBA) with forced ventilation full face mask. The product is not flammable, but may react on contact with combustible materials releasing sufficient heat of hydration to cause a trigger. In case of fire or overheating may cause a rise in pressure, use water spray to cool containers exposed to fire.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

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

#### 6.1.1 For non-emergency personnel

Remove unnecessary and unprotected personnel. Do not touch or walk on spilled material. Avoid breathing vapors or mists. Provide adequate ventilation indoors. Wear suitable protective equipment (see section 8).

#### 6.1.2 For emergency personnel

Do not perform any intervention if this involves any personal risk or without the appropriate training. Wear suitable protective equipment (see section 8).

### 6.2 Environmental precautions

Avoid dispersal of spilled material and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

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

Large spill : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Do not absorb the product with sawdust or other combustible substance. The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Small spill : Stop leak if without risk. Move containers from spill area. Absorb with an inert dry material (do not absorb the product with sawdust or other combustible substance) and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

### 6.4 Reference to other sections

For more information on protective equipment, see section 8.

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### **SECTION 7. HANDLING AND STORAGE**

#### **7.1 Precautions for safe handling**

Wear appropriate personal protective equipment. If during normal use of the material a respiratory hazard occurs, use adequate ventilation or wear appropriate respirator.

Store in the original container or an approved alternative one made from a compatible material, kept tightly closed and upright when not in use. Keep away from alkalis. Empty containers retain product residues and can be dangerous.

It is forbidden eating, drinking or smoking in areas where material is handled, stored or processed. Workers must wash hands and face before eating, drinking and smoking. Avoid contact with eyes, skin or clothing. Do not breathe vapor or mist. Do not swallow.

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

Store according to regulations. Store in original container protected from direct sunlight in a dry, cool and well ventilated area away from incompatible materials (see section 10) and food and drink. Keep away from alkalis. Keep container tightly closed and sealed until use. Opened containers must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Storage temperature preferably between 15 and 25 ° C.

#### **7.3 Specific end use(s)**

See exposure scenarios attached.

### **SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

#### **8.1 Control parameters**

ACGIH 2021:

TLV – TWA = 0.2 mg/m<sup>3</sup>

substance ACGIH A2, suspected human carcinogen, A2 classification refers to sulfuric acid contained in strong inorganic acid mists.

DIR 2009/161/UE:

Limit Values (8 hours) = 0.05 mg/m<sup>3</sup>

Monitoring procedures: Refer to the DIR 98/24/CE.

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**DNEL (Derived No Effect Level)**

| Route      | DNEL Workers             |                             |                       |                         | DNEL general population  |                             |                      |                         |
|------------|--------------------------|-----------------------------|-----------------------|-------------------------|--------------------------|-----------------------------|----------------------|-------------------------|
|            | Long-term, local effects | Long-term, systemic effects | Acute, local effects  | Acute, systemic effects | Long-term, local effects | Long-term, systemic effects | Acute, local effects | Acute, systemic effects |
| oral       | Not derived              | Not derived                 | Not derived           | Not derived             | Not derived              | Not derived                 | Not derived          | Not derived             |
| dermal     | Not derived              | Not derived                 | Not derived           | Not derived             | Not derived              | Not derived                 | Not derived          | Not derived             |
| Inhalation | 0.05 mg/m <sup>3</sup>   | Not derived                 | 0.1 mg/m <sup>3</sup> | Not derived             | Not derived              | Not derived                 | Not derived          | Not derived             |

**DMEL (Derived Minimal Effect Level):** not derived

**PNEC(S) (Predicted No Effect Concentration)**

PNEC freshwater: 0.0025 mg/l

PNEC aqua marine water: 0.00025 mg/l

PNEC sediment: 2\*10<sup>-3</sup> mg/kg ww

PNEC sediment marine water: 2\*10<sup>-3</sup> mg/kg ww

PNEC sewage treatment plant: 8.8 mg/l

**8.2 Exposure controls**

**8.2.1 Appropriate engineering controls**

If operations generate fumes, vapors or mist, working outdoors or in ventilated areas of extraction. Implement appropriate technical and engineering measures to maintain worker exposure to airborne contaminants, below any limit value recommended or required by law. Predict the presence of showers and eyewash fountains in the workplace.

**8.2.2 Individual protection measures, such as personal protective equipment**

- (a) Eye/face protection: Wear splash shield or full face mask with acid vapors filter.
- (b) Skin protection:
  - i) Hand protection: neoprene gloves
  - ii) Other: In case of possibility of accidental contact with the liquid use antacid overalls and boots.
- (c) Respiratory protection: wear full face mask with filter respirator for acid vapors or self contained breathing apparatus
- (d) Thermal hazards: not applicable

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### 8.2.3 Environmental exposure controls

Provide all technical precautions to avoid the dispersion of material in the surrounding environment.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

|   |  |
|---|--|
| a) physical state   | Viscous liquid   |
| b) colour   | From colourless to dark brown  |
| c) odour  | Pungent  |
| d) melting point/freezing point                             | From -1.11 to 3°C  |
| e) boiling point or initial boiling point and boiling range | 310-335°C (OECD)   |
| f) flammability   | The product is not flammable   |
| g) lower and upper explosion limit                          | n.a. H2SO4 is not considered to be explosive on a historical basis (experience of use) and on the basis of a theoretical evaluation of the structure. The substance is an inorganic acid that does not contain chemical groups associated with explosive properties. |
| h) flash point  | the mixture is inorganic, therefore there is no requirement to perform the test  |
| i) auto-ignition temperature                                | n.a. (not flammable)   |
| j) decomposition temperature                                | n.d.   |
| k) ph   | <1 (pKa1 c.a. -9; pKa2 = 1.92 (20 °C))   |
| l) kinematic viscosity                                      | 22,5 mm <sup>2</sup> /s (95% -H2SO4)   |
| m) solubility   | Miscible in water in any proportion  |
| n) partition coefficient n-octanol/water (log value)        | n.a. (not relevant for ionizable molecules)  |
| o) vapour pressure  | 6 Pa at 20 °C (90% aqueous solution)   |
| p) density and/or relative density                          | 1.8361 kg/l  |
| q) relative vapour density                                  | n.a.   |
| r) particle characteristics                                 | n.a.   |

### 9.2 Other information

#### 9.2.1. Information with regard to physical hazard classes

n.a.



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### 9.2.2. Other safety characteristics

Redox potential: sulfuric acid and its salts are not oxidizing.

## SECTION 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

The substance does not present additional dangers of reactivity than those reported in the next subtitle.

### 10.2 Chemical stability

The product is stable.

### 10.3 Possibility of hazardous reactions

Will not occur under normal conditions of storage and use

### 10.4 Conditions to avoid

Highly reactive with water and alkali.

### 10.5 Incompatible materials

Attacks many metals, producing hydrogen (highly flammable) may form explosive mixtures with air. Alkali.

### 10.6 Hazardous decomposition products

None under normal conditions of storage and use

## SECTION 11. TOXICOLOGICAL INFORMATION

The effects of sulphuric acid are essentially the result of the hydrogen ion (local deposition of H<sup>+</sup>, pH change) rather than an effect of the sulphate ion. Sulphuric acid (as such) is not expected to be absorbed or distributed throughout the body as the acid will rapidly dissociate with the hydrogen ion being responsible for the local toxicity (irritation and corrosivity).

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

#### a) Acute toxicity:

*Oral*

Based on the results of the study of acute oral toxicity, there is no no classification for acute oral toxicity according to EU criteria.

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### Method Results Remarks Reference

| Method   | Results                           | Remarks   | Reference   |
|--|-----------------------------------|-----------|---|
| RAT<br>ORAL (gavage)<br>OECD Guideline 401 (Acute Oral Toxicity) | LD50: 2140 mg/kg<br>(male/female) | Key study | Smyth HF<br>jr, Carpenter CP, Weil<br>CS, Pozzani UC,<br>Striegel JA & Nycum<br>JS (1969)<br>OECD (2001a) |

### Inhalation

Although the LC50 by inhalation of various studies carried out with sulfuric acid, theoretically leading to classification with CLP as Acute Tox 3 H331 'Toxic by inhalation', this classification is not made because the effects of acid sulfuric following inhalation are related to local irritation of the respiratory system (limited to the site of contact) and there is no evidence for systemic toxicity of sulfuric acid.

The following is a summary of the study more representative of the registration dossier

| Method                                | Results   | Remarks   | Reference                     |
|---------------------------------------|---|-----------|-------------------------------|
| RAT<br>AEROSOL<br>OECD Guideline 403  | LC50 375 mg/m <sup>3</sup> (male/female)                                      | key study | Runkle BK & Hahn<br>FF (1976) |
| TOPO<br>AEROSOL<br>OECD Guideline 403 | LC50 0.85 mg/l/4 ore<br>(male/female)<br>LC50 0.6 mg/l/8 ore<br>(male/female) | key study | Runkle BK & Hahn<br>FF (1976) |

### Dermal

No data on acute dermal toxicity in animals are available. Although this is a potential route of exposure for workers, testing is not justified for scientific reasons and on animal welfare grounds. The effects of acute dermal exposure to sulphuric acid on animals can be readily predicted, and the data from human exposure are sufficient to characterise the effects.

No classification is proposed for the acute dermal toxicity in the absence of a proper study, the acute dermal toxicity of sulfuric acid is bound to local irritation and corrosion and is adequately expressed by the classification in CLP as Skin Corr 1A H314 (Causes severe skin burns and eye damage).

### b) Skin corrosion/irritation

Sulfuric acid is listed in CLP as Skin Corr 1A H314 (Causes severe skin burns and eye damage). Studies of skin irritation / corrosion are therefore not scientifically justified for reasons of animal protection.

### c) Serious eye damage/irritation

Sulfuric acid is listed in CLP as Skin Corr 1A H314 (Causes severe skin burns and eye damage). Eye irritation studies are therefore not scientifically justified for reasons of animal protection.

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### d) Respiratory or skin sensitisation

No classification is proposed for skin sensitization or respiratory sensitization on the basis of theoretical considerations and in the absence of any outcome in those exposed after use at work for a long period of time.

### e) Germ cell mutagenicity

No classification is proposed for genotoxicity. The absence of mutagenicity was demonstrated in the Ames test, positive results in studies with mammalian cells is attributable to the effects of low pH. There are no studies in vivo, but the lack of systemic exposure to the substance and the lack of genotoxicity of hydrogen and sulfate ion is predicting lack of genotoxicity and therefore not necessary to perform specific tests.

The following is a summary of the study more representative of the registration dossier

| Method   | Results   | Remarks                             | Reference          |
|--|---|-------------------------------------|--------------------|
| bacterial reverse mutation assay (e.g. Ames test) (gene mutation)<br>S. typhimurium TA 1535, TA 1537, TA 98 and TA 100 (met. act.: with and without)<br>Doses: 0 (solvent control), 20, 100, 500, 2500 and 12500 ug/plate; initial assay.<br>0 (solvent control), 775, 1550, 3100, 6200 and 12400 ug/plate; confirmatory assay<br>OECD Guideline 471 | Negative<br>per S. typhimurium<br>TA 1535, TA 1537, TA 98 and TA 100(all strains/cell types tested); met. act.: with and without; cytotoxicity: yes (In some strains) | weight of evidence of CAS 7681-38-1 | Herbold BA (1988a) |

### f) Carcinogenicity

The available animal data do not support the classification of sulphuric acid for carcinogenicity. Weak evidence of a local carcinogenic effect on the forestomach/oesophagus was seen following lifetime oral gavage of rats with sulphuric acid at the MTD. Similarly, some evidence of a local carcinogenic effect on the respiratory tract was seen in rats treated with sulphuric acid by intratracheal instillation over a lifetime. A synergistic effect was seen in animals instilled with sulphuric acid and benzo(a) pyrene. A weak local carcinogenic effect was also seen in mice gavaged with sulphuric acid at the MTD over a lifetime. In all cases, findings were associated with chronic irritation at the site of contact. Although a number of epidemiological studies report a link between exposure to sulphuric acid mists and laryngeal cancer, the individual studies are imprecise and often do not take sufficient account of confounding factors such as smoking and occupational exposure to other chemicals. A number of studies (using various animal species) have not demonstrated any carcinogenic effect of inhalation exposure to sulphuric acid mists.

The following is a summary of the study more representative of the registration dossier.

| Method  | Results   | Remarks            | Reference                       |
|---|---|--------------------|---------------------------------|
| MOUSE<br>Male/female<br>Oral: gavage<br>Exposure: Lifetime (Weekly) | no NOAEL identified (carcinogenicity): 0.2 mL of 0.2% aq solution (male/female)<br>(Benign tumour of the forestomach) | Weight of evidence | Uleckiene S & Gričiute L (1997) |

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**g) Reproductive toxicity**

No classification is proposed for the reproductive and developmental toxicity. Existing data and the absence of systemic exposure indicate that the classification is not necessary.

*Fertility Effects:*

Animal studies are not justified because of the lack of systemic exposure. There is no reason to consider the effects on reproduction that is supported by the results of animal studies which indicate that exposure effects are local.

*Developmental toxicity / teratogenicity:*

The following is a summary of the study more representative of the registration dossier

| Method  | Results   | Remarks   | Reference   |
|---|---|-----------|---|
| Rabbit, mouse (New Zealand White, CF-1)<br>inhalation: aerosol (whole body)<br>0, 5, 20 mg/m <sup>3</sup> (nominal conc.)<br>0, 5.7, 19.3 mg/m <sup>3</sup> (analytical conc.)<br>Exposure: 7 hours/day: Day 6-18 of gestation (rabbit), Day 6-15 of gestation (mouse) (Daily)<br><br>equivalent or similar to OECD Guideline 414 (Prenatal Developmental Toxicity Study) | LOAEC (mouse) (maternal toxicity): 19.3 mg/m <sup>3</sup> air (analytical) (Reduced food consumption)   | key study | Murray FJ, Schwetz BA, Nitschke KD, Crawford AA, Quast JF & Staples RE (1979) |
|   | NOAEC (mouse) (maternal toxicity): 5.7 mg/m <sup>3</sup> air (analytical) (Reduced food consumption)  |           |   |
|   | NOAEC (mouse) (teratogenicity): 19.3 mg/m <sup>3</sup> air (analytical) (No teratogenicity at the highest exposure concentration)                 |           |   |
|   | NOAEC (mouse) (developmental toxicity): 19.3 mg/m <sup>3</sup> air (analytical) (No developmental toxicity at the highest exposure concentration) |           |   |
|   | LOAEC (rabbit) (maternal toxicity): 19.3 mg/m <sup>3</sup> air (analytical) (Reduced weight gain, local effects on the respiratory tract)         |           |   |
|   | NOAEC (rabbit) (maternal toxicity): 5.7 mg/m <sup>3</sup> air (analytical) (Reduced weight gain, local effects on the respiratory tract)          |           |   |
|   | NOAEC (rabbit) (teratogenicity): 19.3 mg/m <sup>3</sup> air (analytical) (No  |           |   |

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| Method | Results  | Remarks | Reference |
|--------|--|---------|-----------|
|        | teratogenicity at the highest exposure level)<br><br>NOAEC (rabbit) (developmental toxicity): 19.3 mg/m <sup>3</sup> air (analytical) (No significant effects at the highest exposure concentration) |         |           |

**h) STOT-single exposure**

Highly irritating to the respiratory tract

**i) STOT-repeated exposure**

Classifications for severe effects after repeated or prolonged exposure was not proposed because even if the studies performed with sulfuric acid highlight the toxicity after repeated / prolonged exposure to low concentrations, there is no possibility of systemic toxicity and the effects observed in these studies are essentially a result of corrosion / irritation.

The following is a key study reported in the registration dossier

| Method  | Results   | Remarks   | Reference   |
|---|---|-----------|---|
| rat (Wistar) female<br>subacute (inhalation: aerosol) (nose only)<br>0.00, 0.2, 1.0, 5.0 mg/m <sup>3</sup> (nominal conc.)<br>0.00, 0.30, 1.38, 5.52 mg/m <sup>3</sup> (analytical conc.)<br>Vehicle: unchanged (no vehicle)<br>Exposure: Animals were exposed for 6 hours/day; 5 days/week for 5 or 28 days. (Animals were exposed for 6 hours/day; 5 days/week for 5 or 28 days.)<br>OECD Guideline 412 (Repeated Dose Inhalation Toxicity: 28/14- Day) | LOAEC: 0.3 mg/m <sup>3</sup> air (analytical) (female) based on: test mat. (Findings at 0.3 mg/m <sup>3</sup> were limited to minimal metaplastic change after 28 days, considered to be an adaptive response to a respiratory irritant.) | key study | Kilgour JD, Foster J, Soames A, Farrar DG & Hext PM (2002)<br>Kilgour JD (2000) |

**j) Aspiration hazard:**

Date non available.

**11.2 Information on other hazards**

**11.2.1. Endocrine disrupting properties**

The substance is not an endocrine disruptor.

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**11.2.2. Other information**

n.a.

**SECTION 12. ECOLOGICAL INFORMATION**

On the basis of ecological information below, and based on the criteria set by the regulations on hazardous substances, sulfuric acid is not dangerous for the environment.

**12.1 Toxicity**

Sulfuric acid is a strong mineral acid that dissociates readily in water to hydrogen ions and sulfate ions and is completely miscible with water. The total dissociation of sulfuric acid to pH environment means that it will not, by itself, or absorbed by particles that can accumulate in living tissue.

The following is a summary of the study more representative of the registration dossier

| Endpoint   | Result  | Remarks              | Reference   |
|--|---|----------------------|---|
| <b>Aquatic toxicity</b>  |   |                      |   |
| Aquatic invertebrates<br>Daphnia magna<br>freshwater<br>static<br>short-term effects                               | EC50 48/h: >100 mg/l  | key study            | Weyers, A(2009a)<br>OECD Guideline 202<br>(Daphnia sp. Acute Immobilisation Test) |
| Aquatic invertebrates<br>Tanytarsus dissimilis<br>long-term effects  | NOEC: 0.15 mg/l   | key study            | Henry L. Bell (1977)<br>OECD (2001f)  |
| Algae<br>Desmodesmus subspicatus (algae)<br>freshwater<br>static   | EC50 (72 h): > 100 mg/L test mat. (nominal) based on: growth rate | key study            | Weyers, A (2009b)<br>OECD Guideline 201<br>(Alga, Growth Inhibition Test)         |
| Fish<br>Lepomis macrochirus<br>freshwater<br>static  | LC50 96h: >16 - <28 mg/l  | key study            | Ellegaard, EG & JY Gilmore III (1984)<br>OECD (2001c)                             |
| long-term effects on fish<br>Salvelinus fontinalis<br>freshwater<br>embryo and sac-fry stage: (sub) lethal effects | NOEC : 0.31 mg/l  | key study            | Hurley, GV, TP Foyle & WJ White (1989)  |
| Jordanella floridae<br>freshwater<br>reproduction, growth and survival<br>flow-through                             | NOEC (65d): 0.025 mg/l  | key study            | Craig, GR & Baksi, WF (1977)<br>OECD (2001c)                                      |
| activated sludge<br>freshwater   | NOEC (37 d): ca. 26 g/l   | "weight of evidence" | R. Yucel Tokuz and W. Wesley Eckenfelder Jr                                       |

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| Endpoint                | Result | Remarks | Reference |
|-------------------------|--------|---------|-----------|
| <b>Aquatic toxicity</b> |        |         |           |
| static                  |        |         | (1979)    |

### 12.2 Persistence and degradability

Biotic Degradability: not required as inorganic compound.

Abiotic Degradability: the product is hydrolyzed

Not persistent.

### 12.3 Bioaccumulative potential

Not bioaccumulative

### 12.4 Mobility in soil

Is not adsorbed by soil particles.

### 12.5 Results of PBT and vPvB assessment

Comparison with the criteria in Annex XIII of REACH.

None of the criteria is met then the sulfuric acid is not a PBT or a substance vPvB.

### 12.6. Endocrine disrupting properties

There are no known adverse effects on the environment caused by the properties of interference with the endocrine system.

### 12.7 Other adverse effects

Not present.

## SECTION 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

Disposal of wastes deriving from the product, including empty containers uncleaned up, has to be done according to official regulations.

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It is therefore advisable to contact authorities or specialized and authorized companies which can provide guidelines on how to prepare the disposal of waste. The product should be disposed according to the official regulation, even if it derives from neutralization of spills or leaks.

Packaging: disposal in accordance with national legislation. Contaminated packaging must be handled with the same precautions used for hazardous substances.

### SECTION 14. TRANSPORT INFORMATION

#### 14.1 UN number or ID number

UN 1830

#### 14.2 UN proper shipping name

SULFURIC ACID with more than 51 percent acid

#### 14.3 Transport hazard class(es)

Road/railway transport (RID/ADR/ADN): Class 8, C1, Kemler 80

Sea transport (IMDG): Class 8

Air transport (IATA): Class 8

#### 14.4 Packing group

II

#### 14.5 Environmental hazards

Not available

#### 14.6 Special precautions for user

Personnel dedicated to loading and unloading operation must undergo a specific training and use mask, gloves and goggles if necessary.

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

Refer to the bulk transport accord to the MARPOL 73/78 Annex II and IBC Code if applicable.



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### SECTION 15. REGULATORY INFORMATION

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

Authorisations according to REACH Regulation: the substance is not subject

Restrictions according to REACH Regulation: subject to restrictions under Title VIII (Annex XVII, item 3)

*Other EU regulations:*

Dir. 2012/18/UE, D. Lgs. 105/2015: the substance is not dangerous under the Seveso Regulation ()

Dir 98/24/EC Hazardous chemical agent

Regulation (EU) 2019/1148: The acquisition, introduction, possession and use of this product by private individuals are subject to restrictions. All suspicious transactions and significant disappearances and thefts must be reported to the relevant national contact point. See [https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/crisis-and-terrorism/explosives/explosives-precursors/docs/list\\_of\\_competent\\_authorities\\_and\\_national\\_contact\\_points\\_en.pdf](https://ec.europa.eu/home-affairs/sites/homeaffairs/files/what-we-do/policies/crisis-and-terrorism/explosives/explosives-precursors/docs/list_of_competent_authorities_and_national_contact_points_en.pdf).

#### 15.2 Chemical safety assessment

Carried out a chemical safety assessment

### SECTION 16. OTHER INFORMATION

#### *List of hazard statements:*

H314 Causes severe skin burns and eye damage.

#### *Advice on any training appropriate for workers:*

Properly train all workers potentially exposed to this substance on the basis of the contents of this safety data sheet

#### *Key literature references and sources for data:*

Registration Dossier of sulfuric acid

#### *Legend of abbreviations and acronyms*

ACGIH: American Conference of Governmental Industrial Hygienists

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- CSR: Chemical Safety Report
- DNEL: Derived No effect Level
- DMEL: Derived Minimal Effect Level
- EC50: Half maximal effective concentration
- IC50: Half maximal inhibitory concentration
- LC50: Lethal concentration, 50%
- LD50: Median lethal dose
- PNEC: Predicted No Effect Concentration
- PBT: Persistent, Bioaccumulative and Toxic substance
- STOT: Specific Target Organ Toxicity
- (STOT) RE: Repeated Exposure
- (STOT) SE: Single Exposure
- TDLO: Lowest published toxic dose
- TLV: Threshold Limit Values
- vPvB: Very Persistent and Very Bioaccumulative

*More information:*

The following are the descriptors of use (to CSR) related to the uses identified in section 1.2

| Exposure Scenario   | Sector of Use (SoU)                           | Process category (PROC)   | Product Category (PC) | Environmental Release Category (ERC) |
|---|---|---------------------------|-----------------------|--------------------------------------|
| ES1- Production of sulphuric acid   | 3   | 1, 2, 3, 4, 8a, 8b, 9     | n.a.                  | 1                                    |
| ES2- Use of sulphuric acid as an intermediate in manufacture of inorganic and organic chemicals incl. fertilizers | 3, 4, 6b, 8, 9, 14                            | 1, 2, 3, 4, 8a, 8b, 9     | 19                    | 6a                                   |
| ES3 - Use of sulphuric acid as a processing aid, catalyst, dehydrating agent, pH regulator                        | 3, 4, 5, 6b, 8, 9, 11, 23, NACE code: E 36-37 | 1, 2, 3, 4, 8a, 8b, 9, 13 | 20                    | 6b                                   |
| ES4 - Use of sulphuric acid for extractions and processing of minerals, ores                                      | 3, 2a, 14                                     | 2, 3, 4                   | 20, 40                | 6b, 4                                |
| ES5 - Use of sulphuric acid in the process of surface treatments, purification and etching                        | 3, 2a, 14, 15, 16                             | 1, 2, 3, 4, 8a, 8b, 9, 13 | 14, 15                | 6b                                   |

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| Exposure Scenario  | Sector of Use (SoU)  | Process category (PROC) | Product Category (PC)              | Environmental Release Category (ERC) |
|--|--|-------------------------|------------------------------------|--------------------------------------|
| ES6 - Use of sulphuric acid in electrolytic processes                            | 3, 14, 15, 17  | 1, 2, 8b, 9, 13         | 14, 20                             | 6b, 5                                |
| ES7 - Use of sulphuric acid in gas purification, scrubbing, flue gas scrubbing   | 3, 8 NACE code : C20.1.1 : manufacturing of industrial gases         | 1, 2,8b                 | 20                                 | 7                                    |
| ES8 - Use of sulphuric acid in production of sulphuric acid contained batteries  | 3 or 0 – NACE Code C27.2 (Manufacture of batteries and accumulators) | 2, 3, 4, 9              | 0 – UCN Code E10100 (Electrolytes) | 2, 5                                 |
| ES9 - Use of sulphuric acid in maintenance of sulphuric acid contained batteries | 22   | 19                      | 0 – UCN Code E10100 (Electrolytes) | 8b, 9b                               |
| ES10 - Use of sulphuric acid in recycling of sulphuric acid contained batteries  | 3  | 2, 4, 5, 8a             | 0 – UCN Code E10100 (Electrolytes) | 1                                    |
| ES11 - Use of sulphuric acid contained batteries                                 | 21   | PROC 19                 | AC 3                               | 9b                                   |
| ES12 - Use of sulphuric acid as laboratory chemicals                             | 22   | 15                      | 21                                 | 8a, 8b                               |
| ES13 - Use of sulphuric acid in industrial cleaning                              | 3  | 2, 5, 8a, 8b, 9, 10, 13 | 35                                 | 8a, 8b                               |
| ES14 - mixing, preparation and repackaging of sulphuric acid                     | 3, 10  | 1, 3, 5, 8a, 8b, 9      |                                    | 2                                    |
| ES15 - Use of sulphuric acid as a drain cleaner                                  | 22   | 8a as worst case        | 35                                 | 8a                                   |
| ES16 - Use of sulphuric acid as a drain cleaner                                  | 21   | n.a.                    | 35                                 | 8a                                   |

Compilation date 24/02/2009

Updates:

Rev.1 - 19/03/2015: Updated sections 1, 8 and 15

Rev.2 – 22/02/2016: Updated sections 1, 2, 5, 11 and 15. Updated the list of identified uses by inserting a new exposure scenario.

Rev.3 – 27/02/2018: Update section 8

Rev.4-15/01/2021: Update of the SDS model as per regulation (EC) 878/2020; updating of sections 1, 3, 8, 9 and 15

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**ANNEX**

**EXPOSURE SCENARIOS**

**SULFURIC ACID 98%**

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### SULFURIC ACID

#### 1. Production of sulphuric acid

|  |  |
|--|--|
| <b>Section 1: Title of exposure scenario</b>   |  |
| <b>Short title of the exposure scenario: Production of sulphuric acid</b>  |  |
| <b>Title systematically based on the use of descriptors</b>  |  |
| Sector of Use: (SU)  | 3  |
| Product Category: (PC)   | n.a.   |
| Process Categories: (PROC)   | 1, 2, 3, 4, 8a, 8b, 9  |
| Environmental Release Category: (ERC)  | 1  |
| <b>Covered processes and activities</b>  |  |
| Production of the substance. Sulphuric acid is most commonly manufactured from sulphur ((obtained from refining of crude oil) or from sulphur-containing gas released from high temperature processes such as metal smelting or burning fossil fuels) The production includes recovery/recycle, loading/unloading, storage, maintenance and sampling |  |
| <b>Evaluation methodology</b>  |  |
| Refer to section 3   |  |
| <b>Section 2 Operational conditions and risk management measures</b>   |  |
| <b>Section 2.1 Control of worker exposure</b>  |  |
| <b>Product Characteristics</b>   |  |
| Physical state   | Liquid   |
| Vapour pressure (Pa)   | 6  |
| Molecular weight   | 98,08  |
| Concentration of substance in product  | 25-100%  |
| <b>Operational conditions</b>  |  |
| Use amount per worker [workplace] per day  | Worker exposure considered to be negligible due to the specialized systems and closed nature of the production process.  |
| Frequency at workplace   | 220 d/year   |
| Duration per day at workplace [for one worker]   | 8hr/d  |
| Other determinants related to duration, frequency and amount of use  | Intermittent contact is expected   |
| Respiration volume under conditions of use   | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use   | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate   | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>   |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required  | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.<br>Waste gas from containers are collected and send by pipeline to a treatment facility (scrubber or filtration) |
| Personal protective equipment (PPE)  | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure.  |

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|  |   |
|--|---|
|  | Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.<br>Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment (gloves, respirator, face shield etc) is intended to cope with the worst case scenario, in order to minimize exposure and risks. |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 1.200.000 t/y   |
| Annual amount used per region  | 19.000.000 t/y  |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                       |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated by on site WWTP which will be neutralised before it reaches the biological tower of the WWTP or will be treated on site by chemical neutralisation methods before release to the municipal STP or to the environment.  |
| Resulting fraction of initially applied amount in waste water released from site to the external sewage system | The neutralisation process is extremely efficient and pH monitors are in place to ensure that complete neutralisation and removal have taken place.   |
| Air emission abatement   | Effectiveness: Adequate measures in place<br>Exhaust gases may be treated by scrubbers or emissions may be measured and controlled according to local legislation.  |
| Release to air   | 33 kg/d<br>(Based on worst case measured emissions associated with production)  |
| Onsite waste treatment   | The waste water neutralisation process is extremely efficient with almost total neutralisation achieved. pH alarms are in place to ensure that successful neutralisation has taken place.   |
| Effluent (of the waste water treatment plant) discharge rate   | 2000 m3/ d (default value)  |
| Recovery of sludge for agriculture or horticulture   | No  |

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|  |  |   |
|--|--|---|
|  | All sludge is collected and incinerated or sent to landfill.             |   |
| <b>Fractions of substance in waste and waste management measures</b>   |  |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                                  | 0 kg/d (value based on the specialised waste water treatment procedures) |   |
| Amount of substances in waste resulting from service life of articles  | n.a.   |   |
| Type of waste, suitable waste codes  | Suitable EWC code(s)   |   |
| Type of external treatment aiming at recycling or recovery of substances   | None   |   |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.  |   |
| Fraction of substance released into the environment via air from waste handling  | n.a.   |   |
| Fraction of substance released into the environment via waste water from waste handling  | n.a.   |   |
| Fraction of substance disposed of as secondary waste   | n.a.   |   |
| <b>Section 3 Exposure estimation</b>   |  |   |
| <b>3.1 Health</b>  |  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations<br>ECETOC TRA Model input parameters:          |  |   |
|  | Parameter  |   |
| Molecular weight   | 98,08 g/ mol   |   |
| Vapour pressure  | 6 Pa   |   |
| Is the substance a solid?  | No: liquid   |   |
| Dustiness during process   | n.a.   |   |
| Duration of activity   | > 4 h  |   |
| Use of ventilation   | Indoors without LEV  |   |
| The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for risk characterisation purposes. |  |   |
| ART model to conduct a Tier 2 assessment of inhalation exposure concentrations<br>ART Model input parameters:                        |  |   |
|  | PROC   | Parameters/assumptions  |
| Exposure duration  | All  | 480 mins  |
| Product type   | All  | Liquid (medium viscosity – like oil)  |
| Process temperature  | 1, 2, 3, 4   | Hot processes (50-150°C)  |
|  | 8a, 8b, 9  | Room temperature (15-25°C)  |
| Vapour pressure  | All  | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)   |
| Liquid weight fraction   | All  | 0,98  |
| Primary emission source proximity  | 1, 2   | Primary emission source is not located in the breathing zone of the worker - the assessment for this activity involves a primary far-field emission source only (workers are in a control room) |



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|                           |                 |  |
|---------------------------|-----------------|--|
|                           | 3, 4, 8A, 8b, 9 | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class            | All             | Transfer of liquid products  |
| Containment               | 1, 2, 3, 9      | Handling reduces contact between product and adjacent air                                  |
|                           | 4               | Open process, submerged loading  |
|                           | 8a, 8b          | n.a.   |
| Localized controls        | 1, 3, 8b        | Vapour recovery system, LEV  |
|                           | 2, 4, 9         | Vapour recovery  |
|                           | 8a              | None   |
| Segregation               | 1, 2            | Complete segregation of workers in separate control room                                   |
| Fugitive emission sources | 1, 3, 8b, 9     | Process fully enclosed – not breached for sampling   |
|                           | 2, 4, 8a        | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                | 1, 2, 8a, 8b    | Outdoors not close to buildings  |
|                           | 3, 4            | Outdoors near to buildings   |
|                           | 9               | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value                      | Unit                   | ERC default (if applicable) |
|--|----------------------------|------------------------|-----------------------------|
| Molecular weight                           | 98,08                      | g/mol                  |                             |
| Vapour pressure at 20°C                    | 0,1                        | hPa                    |                             |
| Water solubility                           | miscible                   | Mg/ml                  |                             |
| Octanol/water partition coefficient        | -1                         | LogKow                 |                             |
| Koc  | 1                          |                        |                             |
| Biodegradability                           | Not biodegradable          |                        |                             |
| Life Cycle Step                            | Production                 |                        |                             |
| Environmental Release Class                | ERC1                       |                        |                             |
| Fraction of Tonnage for Region (1 Tier)    |                            |                        | 1                           |
| STP  |                            |                        | Yes                         |
| Emission events per year                   | 365                        | days                   | 300                         |
| Default Release to Air                     | 5                          | %                      | 5                           |
| Default Release to water                   | 6                          | %                      | 6                           |
| Dilution factor applied for PEC derivation |                            |                        | 10 (20.000 m3/d)            |
| Tonnage assessed                           | Local: 1,2<br>Regional: 19 | Milion tonnes/<br>year |                             |

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RMMs and measured values for tier 2 assessment.

| Description of RMM           | Details                                    | Effect taken into account in EUSES   | Comments  |
|------------------------------|--|--|---|
| No loss to waste water       | 0 mg/l                                     | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days                | 365 emission days per year                 | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal               | Sludge removed to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |
| Measured stack gas emissions | Atmospheric losses of 1.375kg/hour.        | Emission to the air of 33.3 kg/day.  | Worst case emissions                                |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**SULFURIC ACID 98%**

|                |            |              |           |               |                   |
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## 2. Use of sulphuric acid as an Intermediate in manufacture of inorganic and organic chemicals including fertilizers

|   |   |
|---|---|
| <b>Section 1: Title of exposure scenario</b>  |   |
| <b>Short title of the exposure scenario: Use of sulphuric acid as an Intermediate in manufacture of inorganic and organic chemicals including fertilizers</b>   |   |
| <b>Title systematically based on the use of descriptors</b>   |   |
| Sector of Use: (SU)   | 3, 4, 6b, 8, 9, 14  |
| Product Category: (PC)  | 19  |
| Process Categories: (PROC)  | 1, 2, 3, 4, 8a, 8b, 9   |
| Environmental Release Category: (ERC)   | 6a  |
| <b>Covered processes and activities</b>   |   |
| The use of sulphuric acid as an intermediate in the production of inorganic and organic chemicals including but not limited to the production of fertilizers includes the production of oils used for lipolysis, sulphates, nitrogen fertilizers, granulation of complex fertilizers, phosphoric acid (wet process), titanium dioxide (sulphate route), hydrofluoric acid, fine chemicals and specialty chemicals. In addition to these uses the exposure scenario for intermediate use also includes reactive use in water treatment, use as a granulating agent and use as a tanning agent whereas sulphuric acid is consumed in a chemical synthesis to form sulphate. |   |
| <b>Evaluation methodology</b>   |   |
| Refer to section 3  |   |
| <b>Section 2 Operational conditions and risk management measures</b>  |   |
| <b>Section 2.1 Control of worker exposure</b>   |   |
| <b>Product Characteristics</b>  |   |
| Physical state  | Liquid  |
| Vapour pressure (Pa)  | 6   |
| Molecular weight  | 98,08   |
| Concentration of substance in product   | n.a. (sulphuric acid is used up in the process)   |
| <b>Operational conditions</b>   |   |
| Use amount per worker [workplace] per day   | Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.   |
| Frequency at workplace  | 220 d/year  |
| Duration per day at workplace [for one worker]  | 8hr/d   |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected  |
| Respiration volume under conditions of use  | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use  | 480 cm <sup>2</sup> (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.                                |
| Room size and ventilation rate  | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)   |
| <b>Specific Risk management measures</b>  |   |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. |

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|  |   |
|--|---|
|  | Waste gas from containers are collected and send by pipeline to a treatment facility (scrubber or filtration).  |
| Personal protective equipment (PPE)  | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.<br>Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment (gloves, respirator, face shield etc) is intended to cope with the worst case scenario, in order to minimize exposure and risks. |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 300.000 t/y   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                       |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated by on site WWTP which will be neutralised before it reaches the biological tower of the WWTP or will be treated on site by chemical neutralisation methods before release to the municipal STP or to the environment.  |
| Resulting fraction of initially applied amount in waste water released from site to the external sewage system | The neutralisation process is extremely efficient and pH monitors are in place to ensure that complete neutralisation and removal have taken place.   |
| Air emission abatement   | Treated by scrubbers.   |
| Onsite waste treatment   | The waste water neutralisation process is extremely efficient with almost total neutralisation achieved. pH alarms are in place to ensure that successful neutralisation has taken place.   |
| Effluent (of the waste water treatment plant) discharge rate   | 2000 m3/ d (default value)  |
| Recovery of sludge for agriculture or horticulture   | No<br>All sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |

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|---|--|
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario | 0 kg/d (value based on the specialised waste water treatment procedures) |
| Amount of substances in waste resulting from service life of articles                               | n.a.   |
| Type of waste, suitable waste codes   | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances                            | None   |
| Type of external treatment aiming at final disposal of the waste                                    | Incineration or landfill.  |
| Fraction of substance released into the environment via air from waste handling                     | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling             | n.a.   |
| Fraction of substance disposed of as secondary waste  | n.a.   |

**Section 3 Exposure estimation**

**3.1 Health**

ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.

ECETOC TRA Model input parameters:

|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC            | Parameters/assumptions  |
|-----------------------------------|-----------------|---|
| Exposure duration                 | All             | 480 mins  |
| Product type                      | All             | Liquid (medium viscosity – like oil)  |
| Process temperature               | 1, 2, 3, 4      | Hot processes (50-150°C)  |
|                                   | 8a, 8b, 9       | Room temperature (15-25°C)  |
| Vapour pressure                   | All             | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)   |
| Liquid weight fraction            | All             | 0,98  |
| Primary emission source proximity | 1, 2            | Primary emission source is not located in the breathing zone of the worker - the assessment for this activity involves a primary far-field emission source only (workers are in a control room) |
|                                   | 3, 4, 8A, 8b, 9 | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)  |
| Activity class                    | All             | Transfer of liquid products   |

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|                           |              |   |
|---------------------------|--------------|---|
| Containment               | 1, 2, 3, 9   | Handling reduces contact between product and adjacent air       |
|                           | 4            | Open process, submerged loading                                 |
|                           | 8a, 8b       | n.a.  |
| Localized controls        | 1, 3, 8b     | Vapour recovery system, LEV                                     |
|                           | 2, 4, 9      | Vapour recovery   |
|                           | 8a           | None  |
| Segregation               | 1, 2         | Complete segregation of workers in separate control room        |
| Fugitive emission sources | 1, 3, 8b, 9  | Process fully enclosed – not breached for sampling              |
|                           | 2, 4, 8a     | Not fully enclosed – effective housekeeping practices in place. |
| Dispersion                | 1, 2, 8a, 8b | Outdoors not close to buildings                                 |
|                           | 3, 4         | Outdoors near to buildings                                      |
|                           | 9            | Indoors, any sized room, only good natural ventilation          |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value             | Unit         | ERC default (if applicable)     |
|--|-------------------|--------------|---------------------------------|
| Molecular weight                           | 98,08             | g/mol        |                                 |
| Vapour pressure at 20°C                    | 0,1               | hPa          |                                 |
| Water solubility                           | miscible          | Mg/ml        |                                 |
| Octanol/water partition coefficient        | -1                | LogKow       |                                 |
| Koc  | 1                 |              |                                 |
| Biodegradability                           | Not biodegradable |              |                                 |
| Life Cycle Step                            | Industrial use    |              |                                 |
| Environmental Release Class                | ERC 6A            |              |                                 |
| Fraction of Tonnage for Region (1 Tier)    |                   |              | 1                               |
| STP  |                   |              | Yes                             |
| Emission events per year                   | 365               | days         | 300                             |
| Default Release to Air                     | 5                 | %            | 5                               |
| Default Release to water                   | 2                 | %            | 2                               |
| Dilution factor applied for PEC derivation |                   |              | 10 (20.000 m3/d)                |
| Tonnage assessed                           | Local: 300.000    | tonnes/ year | Worst case single site use rate |

RMMs and measured values for tier 2 assessment.

| Description of RMM | Details | Effect taken into account in EUSES | Comments |
|--------------------|---------|------------------------------------|----------|
|--------------------|---------|------------------------------------|----------|

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|                              |   |  |   |
|------------------------------|---|--|---|
| No loss to waste water       | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days                | 365 emission days per year  | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal               | Sludge removed to landfill or incinerated.  | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |
| Measured stack gas emissions | Worst case concentration of 46 mg/m <sup>3</sup> and an hourly flow rate of 86,000 m <sup>3</sup> /h. | Emission to the air of 94,9 kg/day.  | Worst case emissions                                |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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### 3 Use of sulphuric acid as a processing aid, catalyst, dehydrating agent, pH regulator.

|   |   |
|---|---|
| <b>Section 1: Title of exposure scenario</b>  |   |
| Short title of the exposure scenario: Use of sulphuric acid as a processing aid, catalyst, dehydrating agent, pH regulator  |   |
| Title systematically based on the use of descriptors  |   |
| Sector of Use: (SU)   | 3, 4, 5, 6b, 8, 9, 11, 23   |
| Product Category: (PC)  | 20  |
| Process Categories: (PROC)  | 1, 2, 3, 4, 8a, 8b, 9, 13, 6b   |
| Environmental Release Category: (ERC)   | 6a  |
| <b>Covered processes and activities</b>   |   |
| Sulphuric acid is used in the industrial manufacture of organic chemicals and fine chemicals. These processes include using sulphuric acid in large volumes as a processing aid, catalyst or dehydration agent in the chemical process of manufacture of adhesives, explosives, acids, organic salts, dyes and pigments, biofuels, pharmaceuticals and the alkylation of aliphatics. Sulphuric acid may also be used to regulate pH in water streams and as a process aid in the leather and textiles industry. |   |
| <b>Evaluation methodology</b>   |   |
| Refer to section 3  |   |
| <b>Section 2 Operational conditions and risk management measures</b>  |   |
| <b>Section 2.1 Control of worker exposure</b>   |   |
| <b>Product Characteristics</b>  |   |
| Physical state  | Liquid  |
| Vapour pressure (Pa)  | 6   |
| Molecular weight  | 98,08   |
| Concentration of substance in product   | 98% (Concentrated acid generally used)  |
| <b>Operational conditions</b>   |   |
| Use amount per worker [workplace] per day   | Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.   |
| Frequency at workplace  | 220 d/year  |
| Duration per day at workplace [for one worker]  | 8hr/d   |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected  |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.  |
| Room size and ventilation rate  | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)   |
| <b>Specific Risk management measures</b>  |   |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.<br>Waste gas from containers are collected and send by pipeline to a treatment facility (scrubber or filtration). |



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|  |   |
|--|---|
| Personal protective equipment (PPE)  | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.<br>Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment (gloves, respirator, face shield etc) is intended to cope with the worst case scenario, in order to minimize exposure and risks. |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 100.000 t/y (worst case site)   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                       |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated by on site WWTP which will be neutralised before it reaches the biological tower of the WWTP or will be treated on site by chemical neutralisation methods before release to the municipal STP or to the environment.  |
| Resulting fraction of initially applied amount in waste water released from site to the external sewage system | The neutralisation process is extremely efficient and pH monitors are in place to ensure that complete neutralisation and removal have taken place.   |
| Air emission abatement   | Treated by scrubbers.   |
| Resulting fraction of applied amount in waste gas released to environment                                      | 274 kg/d  |
| Onsite waste treatment   | The waste water neutralisation process is extremely efficient with almost total neutralisation achieved. pH alarms are in place to ensure that successful neutralisation has taken place.   |
| Effluent (of the waste water treatment plant) discharge rate   | 2000 m3/ d (default value)  |
| Recovery of sludge for agriculture or horticulture   | No<br>All sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from   | 0 kg/d (value based on the specialised waste water  |

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|   |                           |
|---|---------------------------|
| identified uses covered in the exposure scenario  | treatment procedures)     |
| Amount of substances in waste resulting from service life of articles                   | n.a.                      |
| Type of waste, suitable waste codes   | Suitable EWC code(s)      |
| Type of external treatment aiming at recycling or recovery of substances                | None                      |
| Type of external treatment aiming at final disposal of the waste                        | Incineration or landfill. |
| Fraction of substance released into the environment via air from waste handling         | n.a.                      |
| Fraction of substance released into the environment via waste water from waste handling | n.a.                      |
| Fraction of substance disposed of as secondary waste                                    | n.a.                      |

### Section 3 Exposure estimation

#### 3.1 Health

ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.

ECETOC TRA Model input parameters:

|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC                | Parameters/assumptions  |
|-----------------------------------|---------------------|---|
| Exposure duration                 | All                 | 480 mins  |
| Product type                      | All                 | Liquid (medium viscosity – like oil)  |
| Process temperature               | 1, 2, 3, 4          | Hot processes (50-150°C)  |
|                                   | 8a, 8b, 9,13        | Room temperature (15-25°C)  |
| Vapour pressure                   | All                 | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)   |
| Liquid weight fraction            | All                 | 0,98  |
| Primary emission source proximity | 1, 2                | Primary emission source is not located in the breathing zone of the worker - the assessment for this activity involves a primary far-field emission source only (workers are in a control room) |
|                                   | 3, 4, 8A, 8b, 9, 13 | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)  |
| Activity class                    | 1,2,3,4,8a,8b,9     | Transfer of liquid products   |

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|                           |              |   |
|---------------------------|--------------|---|
|                           | 13           | Activities with open liquid surface or reservoirs               |
| Containment               | 1, 2, 3, 9   | Handling reduces contact between product and adjacent air       |
|                           | 4            | Open process, submerged loading                                 |
|                           | 8a, 8b, 13   | n.a.  |
| Localized controls        | 1, 3, 8b     | Vapour recovery system, LEV                                     |
|                           | 2, 4, 9      | Vapour recovery   |
|                           | 8a, 13       | None  |
| Segregation               | 1, 2         | Complete segregation of workers in separate control room        |
| Fugitive emission sources | 1, 3, 8b, 9  | Process fully enclosed – not breached for sampling              |
|                           | 2, 4, 8a, 13 | Not fully enclosed – effective housekeeping practices in place. |
| Dispersion                | 1, 2, 8a, 8b | Outdoors not close to buildings                                 |
|                           | 3, 4         | Outdoors near to buildings                                      |
|                           | 9, 13        | Indoors, any sized room, only good natural ventilation          |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

**EUSES model input parameters**

| Input parameter                            | Value             | Unit         | ERC default (if applicable)         |
|--|-------------------|--------------|-------------------------------------|
| Molecular weight                           | 98,08             | g/mol        |                                     |
| Vapour pressure at 20°C                    | 0,1               | hPa          |                                     |
| Water solubility                           | miscible          | Mg/ml        |                                     |
| Octanol/water partition coefficient        | -1                | LogKow       |                                     |
| Koc  | 1                 |              |                                     |
| Biodegradability                           | Not biodegradable |              |                                     |
| Life Cycle Step                            | Industrial use    |              |                                     |
| Environmental Release Class                | ERC 6B            |              |                                     |
| Fraction of Tonnage for Region (1 Tier)    |                   |              | 1                                   |
| STP  |                   |              | Yes                                 |
| Emission events per year                   | 365               | days         | 300 (bases on tonnage band and use) |
| Default Release to Air                     | 0,1               | %            | 0,1                                 |
| Default Release to water                   | 5                 | %            | 5                                   |
| Dilution factor applied for PEC derivation |                   |              | 10 (20.000 m3/d)                    |
| Tonnage assessed                           | 100.000           | tonnes/ year |                                     |

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RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details                                    | Effect taken into account in EUSES   | Comments  |
|------------------------|--|--|---|
| No loss to waste water | 0 mg/l                                     | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                 | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2. 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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#### 4 Use of sulphuric acid for extractions and processing of minerals, ores

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid for extractions and processing of minerals, ores</b>   |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 2a, 3, 14  |
| Product Category: (PC)  | 20, 40   |
| Process Categories: (PROC)  | 2, 3, 4  |
| Environmental Release Category: (ERC)   | 4, 6b  |
| <b>Covered processes and activities</b>   |  |
| This use includes leaching, dissolution and enrichment of ores including zinc, copper, nickel and uranium. Metal removal from sand and clay and titanium limonite leaching are also encompassed under this use. The sulphuric acid can then be stripped of its ore or minerals and can then be re-circulated and re-used. |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 6  |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | 98% (Generally concentrated sulphuric acid is used initially but it may be diluted somewhat for certain applications and in the formulation of the extraction solution.)   |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.  |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - These tasks rarely take a full 8hr / day  |
| Respiration volume under conditions of use  | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm <sup>2</sup> (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered. The heap leaching processes in Europe do not take place in the open air usually. |
| Personal protective equipment (PPE)   | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Workers involved in sampling and transfer of materials to road tankers are   |

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|  | trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimise exposure and risks. |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 438 t/y (worst case site)   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment.   |
| Onsite waste treatment   | All sludge is collected and processed for residual metal recovery, incinerated or sent to landfill.   |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances   | None  |
| Type of external treatment aiming at final disposal of the waste   | Residual, metal recovery, incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling  | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.  |
| Fraction of substance disposed of as secondary waste   | n.a.  |
| <b>Section 3 Exposure estimation</b>   |   |
| <b>3.1 Health</b>  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |   |
|  | Parameter   |
| Molecular weight   | 98,08 g/ mol  |

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|                           |                     |
|---------------------------|---------------------|
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC         | Parameters/assumptions   |
|-----------------------------------|--------------|--|
| Exposure duration                 | All          | 480 mins   |
| Product type                      | All          | Liquid (medium viscosity – like oil)   |
| Process temperature               | 1, 2, 3, 4   | Hot processes (50-150°C)   |
|                                   | 8a, 8b, 9,13 | Room temperature (15-25°C)   |
| Vapour pressure                   | All          | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)                          |
| Liquid weight fraction            | All          | 0,98   |
| Primary emission source proximity | 2            | Primary emission source is not located in the breathing zone of the worker (workers are in a control room) |
|                                   | 3, 4         | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)                 |
| Activity class                    | All          | Transfer of liquid products  |
| Containment                       | 2, 3         | Handling reduces contact between product and adjacent air  |
|                                   | 4            | Open process, submerged loading  |
| Localized controls                | 2            | Vapour recovery system, LEV  |
|                                   | 2, 4         | Vapour recovery  |
| Segregation                       | 2            | Complete segregation of workers in separate control room   |
| Fugitive emission sources         | 3            | Process fully enclosed – not breached for sampling   |
|                                   | 2, 4         | Not fully enclosed – effective housekeeping practices in place.  |
| Dispersion                        | 2            | Outdoors not close to buildings  |
|                                   | 3, 4         | Outdoors near to buildings   |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

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| Input parameter                            | Value                    | Unit         | ERC default (if applicable) |
|--|--------------------------|--------------|-----------------------------|
| Molecular weight                           | 98,08                    | g/mol        |                             |
| Vapour pressure at 20°C                    | 0,1                      | hPa          |                             |
| Water solubility                           | miscible                 | Mg/ml        |                             |
| Octanol/water partition coefficient        | -1                       | LogKow       |                             |
| Koc  | 1                        |              |                             |
| Biodegradability                           | Not biodegradable        |              |                             |
| Life Cycle Step                            | Industrial use           |              |                             |
| Environmental Release Class                | ERC 6B and 4             |              |                             |
| Fraction of Tonnage for Region (1 Tier)    |                          |              | 1                           |
| STP  |                          |              | Yes                         |
| Emission events per year                   | 330                      | days         | 20                          |
| Default Release to Air                     | ERC4 : 95<br>ERC 6B: 0,1 | %            | ERC4 : 95<br>ERC 6B: 0,1    |
| Default Release to water                   | ERC4 : 100<br>ERC 6B: 5  | %            | ERC4 : 100<br>ERC 6B: 5     |
| Dilution factor applied for PEC derivation |                          |              | 10 (20.000 m3/d)            |
| Tonnage assessed                           | 438                      | tonnes/ year |                             |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details  | Effect taken into account in EUSES   | Comments  |
|------------------------|--|--|---|
| No loss to waste water | 0 mg/l   | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year   | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge processed for metal recovery, removed to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**5. Use of sulphuric acid in the process of surface treatments, purification and etching**

|  |  |
|--|--|
| <b>Section 1: Title of exposure scenario</b>   |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid in the process of surface treatments, purification and etching</b>  |  |
| <b>Title systematically based on the use of descriptors</b>  |  |
| Sector of Use: (SU)  | 2a, 3, 14, 15, 16  |
| Product Category: (PC)   | 14, 15   |
| Process Categories: (PROC)   | 1,2, 3, 4, 8a, 8b, 9, 13   |
| Environmental Release Category: (ERC)  | 6b   |
| <b>Covered processes and activities</b>  |  |
| Use of sulphuric acid as a metal surface treatment and etching agent. Sulphuric acid is used in this manner to pickle metallic surface prior to electrolysis in order to remove impurities, stains, rust or other inorganic contaminants. Used pickling fluid is generally neutralised and does not have any consumer application. |  |
| <b>Evaluation methodology</b>  |  |
| Refer to section 3   |  |
| <b>Section 2 Operational conditions and risk management measures</b>   |  |
| <b>Section 2.1 Control of worker exposure</b>  |  |
| <b>Product Characteristics</b>   |  |
| Physical state   | Liquid   |
| Vapour pressure (Pa)   | 6  |
| Molecular weight   | 98,08  |
| Concentration of substance in product  | 98% (Concentrated acid. Slightly diluted concentrations may also be used)  |
| <b>Operational conditions</b>  |  |
| Use amount per worker [workplace] per day  | Worker exposure should be low and controlled   |
| Frequency at workplace   | 220 d/year   |
| Duration per day at workplace [for one worker]   | 8hr/d  |
| Other determinants related to duration, frequency and amount of use  | Intermittent contact is expected -   |
| Respiration volume under conditions of use   | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use   | 480 cm <sup>2</sup> (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate   | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>   |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required  | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered.                              |
| Personal protective equipment (PPE)  | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered. Workers involved in sampling |

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|  | 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 minimise exposure and risks. |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 10.000 t/y (worst case site)  |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment.   |
| Recovery of sludge for agriculture or horticulture   | No, all sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances   | None  |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling  | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.  |
| Fraction of substance disposed of as secondary waste   | n.a.  |
| <b>Section 3 Exposure estimation</b>   |   |
| <b>3.1 Health</b>  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |   |
|  | Parameter   |

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|                           |                     |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC                | Parameters/assumptions   |
|-----------------------------------|---------------------|--|
| Exposure duration                 | All                 | 480 mins   |
| Product type                      | All                 | Liquid (medium viscosity – like oil)   |
| Process temperature               | 1, 2, 3, 4          | Hot processes (50-150°C)   |
|                                   | 8a, 8b, 9,13        | Room temperature (15-25°C)   |
| Vapour pressure                   | All                 | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)                          |
| Liquid weight fraction            | All                 | 0,98   |
| Primary emission source proximity | 1, 2                | Primary emission source is not located in the breathing zone of the worker (workers are in a control room) |
|                                   | 3, 4, 8a, 8b, 9, 13 | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)                 |
| Activity class                    | 1,2,3,4,8a,8b,9     | Transfer of liquid products  |
|                                   | 13                  | Activities with open liquid surface or reservoirs  |
| Containment                       | 1, 2, 3, 9          | Handling reduces contact between product and adjacent air  |
|                                   | 4                   | Open process, submerged loading  |
|                                   | 8a, 8b, 13          | n.a.   |
| Localized controls                | 1, 2, 3, 8b         | Vapour recovery system, LEV  |
|                                   | 2, 4, 9             | Vapour recovery  |
|                                   | 8a, 13              | None   |
| Segregation                       | 1, 2                | Complete segregation of workers in separate control room   |
| Fugitive emission sources         | 1, 3, 8b, 9         | Process fully enclosed – not breached for sampling   |
|                                   | 2, 4, 8a, 13        | Not fully enclosed – effective housekeeping practices in place.  |
| Dispersion                        | 1, 2, 8a, 8b        | Outdoors not close to buildings  |
|                                   | 3, 4                | Outdoors near to buildings   |
|                                   | 9, 13               | Indoors, any sized room, only good natural ventilation   |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

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### 3.2 Environment

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.  
Tier 1 assessment resulted a not realistic exposition.  
Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value             | Unit         | ERC default (if applicable) |
|--|-------------------|--------------|-----------------------------|
| Molecular weight                           | 98,08             | g/mol        |                             |
| Vapour pressure at 20°C                    | 0,1               | hPa          |                             |
| Water solubility                           | miscible          | Mg/ml        |                             |
| Octanol/water partition coefficient        | -1                | LogKow       |                             |
| Koc  | 1                 |              |                             |
| Biodegradability                           | Not biodegradable |              |                             |
| Life Cycle Step                            | Industrial use    |              |                             |
| Environmental Release Class                | ERC 6B            |              |                             |
| Fraction of Tonnage for Region (1 Tier)    |                   |              | 1                           |
| STP  |                   |              | Yes                         |
| Emission events per year                   | 365               | days         | 20                          |
| Default Release to Air                     | 0,1               | %            | 0,1                         |
| Default Release to water                   | 5                 | %            | 5                           |
| Dilution factor applied for PEC derivation |                   |              | 10 (20.000 m3/d)            |
| Tonnage assessed                           | 10.000            | tonnes/ year |                             |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details   | Effect taken into account in EUSES   | Comments  |
|------------------------|---|--|---|
| No loss to waste water | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                          | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed and sent to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

### Section 4 Guidance to check compliance with exposure scenario

#### 4.1 Health

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

#### 4.2 Environment

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks

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are managed to at least equivalent levels.

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### 6 Use of sulphuric acid in electrolytic processes

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid in electrolytic processes</b>  |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 3, 14, 17  |
| Product Category: (PC)  | 14, 20   |
| Process Categories: (PROC)  | 1, 2, 8b, 9, 13  |
| Environmental Release Category: (ERC)   | 05, 6b   |
| <b>Covered processes and activities</b>   |  |
| Use of sulphuric acid in electrolytic processes includes metal refining, electroplating of zinc and electrogalvanizing of iron and steel. The electrolytic processes take place in a specially constructed vessel which contains a bath of sulphuric acid solution. Two electrical poles are located either side of the acid bath and these pass current through the electrolyte to achieve electrolysis. |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 6  |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | 95%-98% (This concentration is used to prepare a diluted electrolyte solution.)  |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Worker exposure should be low and controlled   |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected -   |
| Respiration volume under conditions of use  | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm <sup>2</sup> (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Working with sulphuric acid involves, special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Electrolysis is most commonly taking place not in the open air. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered. |
| Personal protective equipment (PPE)   | Working with sulphuric acid involves, special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed   |

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|   |   |
|---|---|
|   | i.e. removed and scrubbed and /or filtered. Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment (gloves, respirator, face-shield, etc.) is intended to cope with the worst case scenario, in order to minimise exposure and risks. PROC 13 requires respiratory system protection at least with an efficiency of 95%. |
| Other risk management measures related to workers   | Other measures not required   |
| <b>Section 2.2 Control of environmental exposure</b>  |   |
| <b>Product characteristics</b>  |   |
| Molecular weight  | 98,08   |
| Vapour pressure at 20°C (hPa)   | 0,1   |
| Water solubility  | Miscible  |
| Octanol/water partition coefficient   | -1 (logKow)   |
| Koc   | 1   |
| Biodegradability  | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>  |   |
| Annual amount used per site   | 2.306 t/y (worst case site)   |
| <b>Frequency and duration of use</b>  |   |
| continuous production   |   |
| Emission days   | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>                                |   |
| Discharge volume of sewage treatment plant  | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site                                   | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>            |   |
| Onsite pre-treatment of waste water   | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment.   |
| Recovery of sludge for agriculture or horticulture  | No, all sludge is collected and processed for metal recovery, incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>                                |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles                               | n.a.  |
| Type of waste, suitable waste codes   | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances                            | Metal recovery, incineration or landfill.   |
| Type of external treatment aiming at final disposal of the waste                                    | Metal recovery, incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling                     | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling             | n.a.  |
| Fraction of substance disposed of as secondary waste  | n.a.  |
| <b>Section 3 Exposure estimation</b>  |   |
| <b>3.1 Health</b>   |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.              |   |

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ECETOC TRA Model input parameters:

|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC            | Parameters/assumptions   |
|-----------------------------------|-----------------|--|
| Exposure duration                 | All             | 480 mins   |
| Product type                      | All             | Liquid (medium viscosity – like oil)   |
| Process temperature               | 1,2             | Hot processes (50-150°C)   |
|                                   | 8b, 9, 13       | Room temperature (15-25°C)   |
| Vapour pressure                   | All             | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)                          |
| Liquid weight fraction            | All             | 0,98   |
| Primary emission source proximity | 1,2             | Primary emission source is not located in the breathing zone of the worker (workers are in a control room) |
|                                   | 8b, 9, 13       | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)                 |
| Activity class                    | 1,2,3,4,8a,8b,9 | Transfer of liquid products  |
|                                   | 13              | Activities with open liquid surface or reservoirs  |
| Containment                       | 1, 2, 9         | Handling reduces contact between product and adjacent air  |
|                                   | 8b, 13          | Open process, submerged loading  |
| Localized controls                | 1, 8b           | Vapour recovery system, LEV  |
|                                   | 2, 9            | Vapour recovery  |
|                                   | 13              | LE   |
| Segregation                       | 1, 2            | Complete segregation of workers in separate control room   |
| Fugitive emission sources         | 1, 8b, 9        | Process fully enclosed – not breached for sampling   |
|                                   | 2, , 13         | Not fully enclosed – effective housekeeping practices in place.  |
| Dispersion                        | 1, 2, 8a, 8b    | Outdoors not close to buildings  |
|                                   | 39, 13          | Indoors, any sized room, only good natural ventilation (LEV applied when needed)                           |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories, except



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PROC13, which requires a breathing system protection with an efficiency at least of 95%.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.  
Tier 1 assessment resulted a not realistic exposition.  
Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value                     | Unit         | ERC default (if applicable) |
|--|---------------------------|--------------|-----------------------------|
| Molecular weight                           | 98,08                     | g/mol        |                             |
| Vapour pressure at 20°C                    | 0,1                       | hPa          |                             |
| Water solubility                           | miscible                  | Mg/ml        |                             |
| Octanol/water partition coefficient        | -1                        | LogKow       |                             |
| Koc  | 1                         |              |                             |
| Biodegradability                           | Not biodegradable         |              |                             |
| Life Cycle Step                            | Industrial use            |              |                             |
| Environmental Release Class                | ERC 6B and 5              |              |                             |
| Fraction of Tonnage for Region (1 Tier)    |                           |              | 1                           |
| STP  |                           |              | Yes                         |
| Emission events per year                   | 365                       | days         | 100                         |
| Default Release to Air                     | ERC 6b : 0,1<br>ERC 5: 50 | %            | ERC 6b : 0,1<br>ERC 5: 50   |
| Default Release to water                   | ERC 6b : 5<br>ERC 5: 50   | %            | ERC 6b: 5<br>ERC 5: 50      |
| Dilution factor applied for PEC derivation |                           |              | 10 (20.000 m3/d)            |
| Tonnage assessed                           | 2.306                     | tonnes/ year |                             |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details   | Effect taken into account in EUSES   | Comments  |
|------------------------|---|--|---|
| No loss to waste water | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                          | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed and sent to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
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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**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.

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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**7 Use of sulphuric acid in gas purification, scrubbing and flue gas scrubbing.**

|  |  |
|--|--|
| <b>Section 1: Title of exposure scenario</b>   |  |
| <b>Short title of the exposure scenario: 7 Use of sulphuric acid in gas purification, scrubbing and flue gas scrubbing.</b>  |  |
| <b>Title systematically based on the use of descriptors</b>  |  |
| Sector of Use: (SU)  | 3, 8   |
| Product Category: (PC)   | 20   |
| Process Categories: (PROC)   | 1, 2, 8b   |
| Environmental Release Category: (ERC)  | 7  |
| <b>Covered processes and activities</b>  |  |
| Use of concentrated sulphuric acid as agent for gas purification, including gas scrubbing and flue gas scrubbing. The main applications of this would be in purification of gas from coke ovens and in the purification and drying of industrial gases generated from the manufacture of other substances. |  |
| <b>Evaluation methodology</b>  |  |
| Refer to section 3   |  |
| <b>Section 2 Operational conditions and risk management measures</b>   |  |
| <b>Section 2.1 Control of worker exposure</b>  |  |
| <b>Product Characteristics</b>   |  |
| Physical state   | Liquid   |
| Vapour pressure (Pa)   | 6  |
| Molecular weight   | 98,08  |
| Concentration of substance in product  | 98% (Concentrated acid. Slightly diluted concentrations may also be used)  |
| <b>Operational conditions</b>  |  |
| Use amount per worker [workplace] per day  | Worker exposure should be low and controlled   |
| Frequency at workplace   | 220 d/year   |
| Duration per day at workplace [for one worker]   | 8hr/d  |
| Other determinants related to duration, frequency and amount of use  | Intermittent contact is expected -   |
| Respiration volume under conditions of use   | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use   | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate   | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>   |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required  | The processes associated with sulphuric acid involve special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered.  |
| Personal protective equipment (PPE)  | Use of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered. Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and |

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|   | protective equipment (chemical resistant clothing, goggles and respiratory equipment, face-shield, etc.) is intended to cope with the worst case scenario, in order to minimise exposure and risks.                      |
| Other risk management measures related to workers   | A safety shower is required nearby loading and unloading areas in case of accidental spillage.   |
| <b>Section 2.2 Control of environmental exposure</b>  |  |
| <b>Product characteristics</b>  |  |
| Molecular weight  | 98,08  |
| Vapour pressure at 20°C (hPa)   | 0,1  |
| Water solubility  | Miscible   |
| Octanol/water partition coefficient   | -1 (logKow)  |
| Koc   | 1  |
| Biodegradability  | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)  |
| <b>Amount of use</b>  |  |
| Annual amount used per site   | 30.000 t/y (worst case site. In addition to this amount one company has quoted an emission of around 1.5 tonnes per day direct to surface water after contamination removal).  |
| <b>Frequency and duration of use</b>  |  |
| continuous production   |  |
| Emission days   | 365 d/y  |
| <b>Other operational conditions affecting environmental exposure</b>                                |  |
| Discharge volume of sewage treatment plant  | 2000 m3/d (EUSES default value for standard local STP)   |
| Available river water volume to receive the emissions from a site                                   | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )   |
| <b>Risk management measures related to environmental emissions from industrial sites</b>            |  |
| Onsite pre-treatment of waste water   | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment. Spent acid solutions are neutralized to circumneutral pH prior to discharge. |
| Recovery of sludge for agriculture or horticulture  | No, all sludge is collected and incinerated or sent to landfill.   |
| <b>Fractions of substance in waste and waste management measures</b>                                |  |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario | 0 kg/d (value based on the specialised waste water treatment procedures)   |
| Amount of substances in waste resulting from service life of articles                               | n.a.   |
| Type of waste, suitable waste codes   | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances                            | None   |
| Type of external treatment aiming at final disposal of the waste                                    | Incineration or landfill.  |
| Fraction of substance released into the environment via air from waste handling                     | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling             | n.a.   |
| Fraction of substance disposed of as secondary waste  | n.a.   |
| <b>Section 3 Exposure estimation</b>  |  |

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### 3.1 Health

ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.

ECETOC TRA Model input parameters:

|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC     | Parameters/assumptions   |
|-----------------------------------|----------|--|
| Exposure duration                 | All      | 480 mins   |
| Product type                      | All      | Liquid (medium viscosity – like oil)   |
| Process temperature               | All      | Hot temperature (50-150°C)   |
| Vapour pressure                   | All      | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)                          |
| Liquid weight fraction            | All      | 0,98   |
| Primary emission source proximity | 1, 2     | Primary emission source is not located in the breathing zone of the worker (workers are in a control room) |
|                                   | 8b       | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)                 |
| Activity class                    | All      | Transfer of liquid products  |
| Containment                       | 1, 2     | Handling reduces contact between product and adjacent air  |
|                                   | 8b       | n.a.   |
| Localized controls                | 1, 8b    | Vapour recovery system, LEV  |
|                                   | 2        | Vapour recovery  |
| Segregation                       | 1, 2     | Complete segregation of workers in separate control room   |
| Fugitive emission sources         | 1, 8b    | Process fully enclosed – not breached for sampling   |
|                                   | 2        | Not fully enclosed – effective housekeeping practices in place.  |
| Dispersion                        | 1, 2, 8b | Outdoors not close to buildings  |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

### 3.2 Environment

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description

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of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value  | Unit         | ERC default (if applicable) |
|--|--|--------------|-----------------------------|
| Molecular weight                           | 98,08  | g/mol        |                             |
| Vapour pressure at 20°C                    | 0,1  | hPa          |                             |
| Water solubility                           | miscible   | Mg/ml        |                             |
| Octanol/water partition coefficient        | -1   | LogKow       |                             |
| Koc  | 1  |              |                             |
| Biodegradability                           | Not biodegradable  |              |                             |
| Life Cycle Step                            | Industrial use   |              |                             |
| Environmental Release Class                | ERC 7  |              |                             |
| Fraction of Tonnage for Region (1 Tier)    |  |              | 1                           |
| STP  |  |              | Yes                         |
| Emission events per year                   | 365  | days         | 300                         |
| Default Release to Air                     | 5  | %            | 5                           |
| Default Release to water                   | 5  | %            | 5                           |
| Dilution factor applied for PEC derivation |  |              | 10 (20.000 m3/d)            |
| Tonnage assessed                           | 30,000 (560 tonnes per year emitted to surface water directly in one case) | tonnes/ year |                             |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details  | Effect taken into account in EUSES  | Comments   |
|------------------------|--|---|--|
| No loss to waste water | 0 mg/l (emission to large river with a pH of 8 and a flow rate of 2000 m3/sec) | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process (Dealt with in a qualitative manner) | Total neutralization to around pH 7. (capacity of the river expected to sufficiently dilute any emissions of sulfate species). |
| Emission days          | 365 emission days per year   | Increase emission days by 20%.  | Continuous production  |
| Sludge removal         | Sludge removed and sent to landfill or incinerated.                            | Concentration in soil due to sludge spreading set to 0.   | No contamination of grassland or agricultural soil.  |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3. Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

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Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**8 Use of sulphuric acid in production of sulphuric acid contained batteries**

|  |   |
|--|---|
| <b>Section 1: Title of exposure scenario</b>   |   |
| <b>Short title of the exposure scenario: Use of sulphuric acid in production of sulphuric acid contained batteries</b> |   |
| <b>Title systematically based on the use of descriptors</b>  |   |
| Sector of Use: (SU)  | 3   |
| Product Category: (PC)   | 0   |
| Process Categories: (PROC)   | 2, 3, 4, 9  |
| Environmental Release Category: (ERC)  | 2, 5  |
| <b>Covered processes and activities</b>  |   |
| Use of sulphuric acid in the production of the liquid electrolyte in the production of lead-acid batteries.            |   |
| <b>Evaluation methodology</b>  |   |
| Refer to section 3   |   |
| <b>Section 2 Operational conditions and risk management measures</b>   |   |
| <b>Section 2.1 Control of worker exposure</b>  |   |
| <b>Product Characteristics</b>   |   |
| Physical state   | Liquid  |
| Vapour pressure (Pa)   | 6   |
| Molecular weight   | 98,08   |
| Concentration of substance in product  | 98% (Concentrated acid. Slightly diluted concentrations may also be used)   |
| <b>Operational conditions</b>  |   |
| Use amount per worker [workplace] per day  | Worker exposure should be low and controlled  |
| Frequency at workplace   | 220 d/year  |
| Duration per day at workplace [for one worker]   | 8hr/d   |
| Other determinants related to duration, frequency and amount of use  | Intermittent contact is expected -  |
| Respiration volume under conditions of use   | 10 m3/d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use   | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.  |
| Room size and ventilation rate   | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)   |
| <b>Specific Risk management measures</b>   |   |
| Containment plus good work practice required<br>Local exhaust ventilation if required                                  | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered.   |
| Personal protective equipment (PPE)  | Working with sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. Any gas displaced from containers is conducted via pipeline to be processed i.e. removed and scrubbed and /or filtered. Workers involved in sampling and transfer of materials to road tankers are trained in the procedures and protective equipment (chemical resistant clothing, goggles and respiratory |



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|  | equipment, face-shield, etc.) is intended to cope with the worst case scenario, in order to minimise exposure and risks.                    |
| Other risk management measures related to workers  | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 2.500 t/y (worst case site)   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment. |
| Resulting fraction of initially applied amount in waste water released from site   | Removal by neutralization has been considered.  |
| Recovery of sludge for agriculture or horticulture   | No, all sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances   | None  |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling  | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.  |
| Fraction of substance disposed of as secondary waste   | n.a.  |
| <b>Section 3 Exposure estimation</b>   |   |
| <b>3.1 Health</b>  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |   |

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|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC    | Parameters/assumptions   |
|-----------------------------------|---------|--|
| Exposure duration                 | All     | 480 mins   |
| Product type                      | 2, 3    | Liquid (medium viscosity – like oil)   |
|                                   | 4, 9    | Liquid (low viscosity – like water)  |
| Process temperature               | All     | Room temperature (15-25°C)   |
| Vapour pressure                   | All     | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)          |
| Liquid weight fraction            | 2, 3    | 0,98   |
|                                   | 4, 9    | 0,25   |
| Primary emission source proximity | All     | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | All     | Transfer of liquid products  |
| Containment                       | All     | Handling reduces contact between product and adjacent air                                  |
| Localized controls                | All     | Vapour recovery system, LEV  |
| Segregation                       | n.a.    | n.a.   |
| Fugitive emission sources         | 2       | Process fully enclosed – not breached for sampling   |
|                                   | 3, 4, 9 | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | All     | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter  | Value | Unit  | ERC default (if applicable) |
|------------------|-------|-------|-----------------------------|
| Molecular weight | 98,08 | g/mol |                             |

**SULFURIC ACID 98%**

|                |            |              |           |               |                   |
|----------------|------------|--------------|-----------|---------------|-------------------|
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|  |                        |              |                        |
|--|------------------------|--------------|------------------------|
| Vapour pressure at 20°C                    | 0,1                    | hPa          |                        |
| Water solubility                           | miscible               | Mg/ml        |                        |
| Octanol/water partition coefficient        | -1                     | LogKow       |                        |
| Koc  | 1                      |              |                        |
| Biodegradability                           | Not biodegradable      |              |                        |
| Life Cycle Step                            | Industrial use         |              |                        |
| Environmental Release Class                | ERC 2, 5               |              |                        |
| Fraction of Tonnage for Region (1 Tier)    |                        |              | 1                      |
| STP  |                        |              | Yes                    |
| Emission events per year                   | 365                    | days         | 20                     |
| Default Release to Air                     | ERC2: 2,5<br>ERC5: 5,0 | %            | ERC2: 2,5<br>ERC5: 5,0 |
| Default Release to water                   | ERC2: 2<br>ERC5: 50    | %            | ERC2: 2<br>ERC5: 50    |
| Dilution factor applied for PEC derivation |                        |              | 10 (20.000 m3/d)       |
| Tonnage assessed                           | 2.500                  | tonnes/ year |                        |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details   | Effect taken into account in EUSES   | Comments  |
|------------------------|---|--|---|
| No loss to waste water | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                          | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed and sent to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**SULFURIC ACID 98%**

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**9. Use of sulphuric acid in maintenance of sulphuric acid contained batteries**

|   |   |
|---|---|
| <b>Section 1: Title of exposure scenario</b>  |   |
| <b>Short title of the exposure scenario: Use of sulphuric acid in maintenance of sulphuric acid contained batteries</b> |   |
| <b>Title systematically based on the use of descriptors</b>   |   |
| Sector of Use: (SU)   | 22  |
| Product Category: (PC)  | 0   |
| Process Categories: (PROC)  | 19  |
| Environmental Release Category: (ERC)   | 8b, 9b  |
| <b>Covered processes and activities</b>   |   |
| Use of sulphuric acid in the maintenance of lead-acid batteries.  |   |
| <b>Evaluation methodology</b>   |   |
| Refer to section 3  |   |
| <b>Section 2 Operational conditions and risk management measures</b>  |   |
| <b>Section 2.1 Control of worker exposure</b>   |   |
| <b>Product Characteristics</b>  |   |
| Physical state  | Liquid  |
| Vapour pressure (Pa)  | 214 (for dilute electrolyte solution - based on data for the most dilute mixture available)   |
| Molecular weight  | 98,08   |
| Concentration of substance in product   | From 25% to 40%   |
| <b>Operational conditions</b>   |   |
| Use amount per worker [workplace] per day   | Worker exposure considered to be negligible due to specialised systems.   |
| Frequency at workplace  | 220 d/year  |
| Duration per day at workplace [for one worker]  | 8hr/d   |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - As batteries are sealed articles with a long service life maintenance is required only rarely. These tasks rarely take a full 8hr / day so worst case is assumed.  |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.  |
| Room size and ventilation rate  | n.a. (loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air)  |
| <b>Specific Risk management measures</b>  |   |
| Containment plus good work practice required<br>Local exhaust ventilation if required                                   | n.a. (loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air)  |
| Personal protective equipment (PPE)   | Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves boots and protective overall).<br>Maintenance of batteries is generally carried out by trained technicians in facilities with exposure and waste treatment procedures in place. |
| Other risk management measures related to workers   | A safety shower is required nearby loading and unloading areas in case of accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>  |   |
| <b>Product characteristics</b>  |   |

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|                                     |   |
|-------------------------------------|---|
| Molecular weight                    | 98,08   |
| Vapour pressure at 20°C (hPa)       | 0,1   |
| Water solubility                    | Miscible  |
| Octanol/water partition coefficient | -1 (logKow)   |
| Koc                                 | 1   |
| Biodegradability                    | Not biodegradable<br>(inorganic acids cannot be considered biodegradable) |

**Amount of use**

|                             |                             |
|-----------------------------|-----------------------------|
| Annual amount used per site | 2.500 t/y (worst case site) |
|-----------------------------|-----------------------------|

**Frequency and duration of use**

|                       |         |
|-----------------------|---------|
| continuous production |         |
| Emission days         | 365 d/y |

**Other operational conditions affecting environmental exposure**

|   |  |
|---|--|
| Discharge volume of sewage treatment plant                        | 2000 m3/d (EUSES default value for standard local STP)                                   |
| Available river water volume to receive the emissions from a site | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. ) |

**Risk management measures related to environmental emissions from industrial sites**

None required to demonstrate safe use

**Fractions of substance in waste and waste management measures**

|   |   |
|---|---|
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario | 342 kg/d (based on worst case estimated emission to waste waters identified)    |
| Amount of substances in waste resulting from service life of articles                               | n.a.  |
| Type of waste, suitable waste codes   | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances                            | None.<br>Degradation in the STP into constituent ions. These are non hazardous. |
| Type of external treatment aiming at final disposal of the waste                                    | Incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling                     | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling             | n.a.  |
| Fraction of substance disposed of as secondary waste  | n.a.  |

**Section 3 Exposure estimation**

**3.1 Health**

ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.  
ECETOC TRA Model input parameters:

|                           | Parameter  |
|---------------------------|--|
| Molecular weight          | 98,08 g/ mol   |
| Vapour pressure           | 214 Pa (for dilute electrolyte solution (based on data for the most dilute mixture available). |
| Is the substance a solid? | No: liquid   |
| Dustiness during process  | n.a.   |
| Duration of activity      | > 4 h  |
| Use of ventilation        | Indoors without LEV  |

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

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characterisation purposes.

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC | Parameters/assumptions   |
|-----------------------------------|------|--|
| Exposure duration                 | 19   | 240 mins exposure– 240 mins non-exposure   |
| Product type                      | 19   | Liquid (low viscosity – like water)  |
| Process temperature               | 19   | Room temperature (15-25°C)   |
| Vapour pressure                   | 19   | Substance is considered to be low volatile, exposure to mists is estimated                 |
| Liquid weight fraction            | 19   | 0,25   |
| Primary emission source proximity | 19   | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | 19   | Handling of contaminated objects   |
| Localized controls                | 19   | None   |
| Fugitive emission sources         | 19   | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | 19   | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                         | Value   | Unit   | ERC default (if applicable) |
|---|---|--------|-----------------------------|
| Molecular weight                        | 98,08   | g/mol  |                             |
| Vapour pressure at 20°C                 | 0,1   | hPa    |                             |
| Water solubility                        | miscible  | Mg/ml  |                             |
| Octanol/water partition coefficient     | -1  | LogKow |                             |
| Koc                                     | 1   |        |                             |
| Biodegradability                        | Not biodegradable   |        |                             |
| Life Cycle Step                         | Wide dispersive use   |        |                             |
| Environmental Release Class             | ERC 8b, 9b  |        |                             |
| Fraction of Tonnage for Region (1 Tier) |   |        | 1                           |
| STP                                     |   |        | Yes                         |
| Emission events per year                | 365 (chosen as it is likely that battery maintenance will be carried out at some site within the region on most days due to the small scale but wide dispersive nature of this use) | days   | 365                         |

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|  |                          |              |  |
|--|--------------------------|--------------|--|
| Default Release to Air                     | ERC8b: 0,1<br>ERC9b: 5,0 | %            | ERC8b: 0,1<br>ERC9b: 5,0                     |
| Default Release to water                   | ERC2: 2<br>ERC5: 5       | %            | ERC2: 2<br>ERC5: 5                           |
| Dilution factor applied for PEC derivation |                          |              | 25*10 <sup>9</sup> m3/y<br>(wide dispersive) |
| Tonnage assessed                           | 2.500                    | tonnes/ year | stimate of single site use                   |

RMMs and measured values for tier 2 assessment.  
Not applicable (tier 2 assessment not necessary).

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**10. 0 Use of sulphuric acid in recycling of sulphuric acid contained batteries**

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid in recycling of sulphuric acid contained batteries</b>   |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 3  |
| Product Category: (PC)  | 0  |
| Process Categories: (PROC)  | 2, 4, 5, 8a  |
| Environmental Release Category: (ERC)   | 1  |
| <b>Covered processes and activities</b>   |  |
| <p>The use encompasses the management of sulphuric acid electrolyte in battery recycling. The process of battery recycling is aimed at recovery of the lead from the battery plates and removal of the sulphuric acid electrolyte solution. The batteries are mechanically crushed using, for example, a hydraulic press, and the electrolyte is drained and collected. Recovered acid may be reused for some applications or can be neutralized and treated to remove contaminants and disposed.</p> |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 214 (For dilute electrolyte solution - based on data for the most dilute mixture available).   |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | from 25% to 40%  |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Worker exposure considered to be negligible due to specialised systems.  |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - As batteries are sealed articles with a long service life maintenance is required only rarely. These tasks rarely take a full 8hr / day so worst case is assumed.   |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a. (loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air)   |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air. Workers wear protective clothing (face/eye protection, helmet, anti anti-acid gloves boots and protective overall). |
| Personal protective equipment (PPE)   | Workers wear protective clothing (face/eye protection, helmet, anti anti-acid gloves boots and protective overall).  |
| Other risk management measures related to workers   | A safety shower is required nearby loading and unloading areas in case of accidental spillage.   |



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| Section 2.2 Control of environmental exposure  |   |
|--|---|
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 2.500 t/y (worst case site)   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated on site by chemical and/or biological methods before release to the municipal STP or to the environment. Extracted acid may also be collected and re-used. |
| Recovery of sludge for agriculture or horticulture   | No, all sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances   | None  |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling  | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.  |
| Fraction of substance disposed of as secondary waste   | n.a.  |
| <b>Section 3 Exposure estimation</b>   |   |
| <b>3.1 Health</b>  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |   |
|  | Parameter   |
| Molecular weight   | 98,08 g/ mol  |
| Vapour pressure  | 214 Pa (for dilute electrolyte solution - based on data for the most dilute mixture available).   |
| Is the substance a solid?  | No: liquid  |

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|                          |                     |
|--------------------------|---------------------|
| Dustiness during process | n.a.                |
| Duration of activity     | > 4 h               |
| Use of ventilation       | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC     | Parameters/assumptions   |
|-----------------------------------|----------|--|
| Exposure duration                 | All      | 480 mins   |
| Product type                      | All      | Liquid (low viscosity – like water)  |
| Process temperature               | All      | Room temperature (15-25°C)   |
| Vapour pressure                   | All      | Substance is considered to be low volatile, exposure to mists is estimated                 |
| Liquid weight fraction            | All      | 0,25   |
| Primary emission source proximity | All      | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | 2, 4     | Transfer of liquid products  |
|                                   | 2, 4, 8a | Transfer of liquid products – falling liquids, 1-10 L/min                                  |
|                                   | 5        | Activities with open surfaces  |
| Containment                       | 2        | Handling reduces contact between product and adjacent air                                  |
|                                   | 8a       | Handling reduces contact between product and adjacent air – submerged loading              |
|                                   | 4        | Open process – submerged loading   |
|                                   | 5        | n.a.   |
| Localized controls                | All      | LEV  |
| Fugitive emission sources         | All      | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | All      | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter         | Value    | Unit  | ERC default (if applicable) |
|-------------------------|----------|-------|-----------------------------|
| Molecular weight        | 98,08    | g/mol |                             |
| Vapour pressure at 20°C | 0,1      | hPa   |                             |
| Water solubility        | miscible | Mg/ml |                             |

**SULFURIC ACID 98%**

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|  |                            |              |                  |
|--|----------------------------|--------------|------------------|
| Octanol/water partition coefficient        | -1                         | LogKow       |                  |
| Koc  | 1                          |              |                  |
| Biodegradability                           | Not biodegradable          |              |                  |
| Life Cycle Step                            | Industrial use (recycling) |              |                  |
| Environmental Release Class                | ERC 1                      |              |                  |
| Fraction of Tonnage for Region (1 Tier)    |                            |              | 1                |
| STP  |                            |              | Yes              |
| Emission events per year                   | 365                        | days         | 100              |
| Default Release to Air                     | 5                          | %            | 5                |
| Default Release to water                   | 6                          | %            | 6                |
| Dilution factor applied for PEC derivation |                            |              | 10 (20.000 m3/d) |
| Tonnage assessed                           | 2.500                      | tonnes/ year |                  |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details   | Effect taken into account in EUSES   | Comments  |
|------------------------|---|--|---|
| No loss to waste water | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                          | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed and sent to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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### 11. Use of sulphuric acid contained batteries

|   |   |
|---|---|
| <b>Section 1: Title of exposure scenario</b>  |   |
| <b>Short title of the exposure scenario: Use of sulphuric acid contained batteries</b>  |   |
| <b>Title systematically based on the use of descriptors</b>   |   |
| Sector of Use: (SU)   | 3   |
| Product Category: (PC)  | 0   |
| Process Categories: (PROC)  | 2, 4, 5, 8°   |
| Environmental Release Category: (ERC)   | 1   |
| <b>Covered processes and activities</b>   |   |
| It encompasses the use of sulphuric acid in battery maintenance by the consumer in the form of DIY battery maintenance/top-up kits. |   |
| <b>Evaluation methodology</b>   |   |
| Refer to section 3  |   |
| <b>Section 2 Operational conditions and risk management measures</b>  |   |
| <b>Section 2.1 Control of worker exposure</b>   |   |
| <b>Product Characteristics</b>  |   |
| Physical state  | Liquid  |
| Vapour pressure (Pa)  | 214 (For dilute electrolyte solution)   |
| Molecular weight  | 98,08   |
| Concentration of substance in product   | from 25% to 40%   |
| <b>Operational conditions</b>   |   |
| Use amount per worker [workplace] per day   | Not applicable as this task is carried out sporadically by the consumer   |
| Frequency at workplace  | 220 d/year  |
| Duration per day at workplace [for one worker]  | 8hr/d   |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - As batteries are sealed articles with a long service life maintenance is required only rarely.   |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.  |
| Room size and ventilation rate  | n.a. (loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air)  |
| <b>Specific Risk management measures</b>  |   |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air. Consumers are advised to wear protective clothing, however, the worst case assumption is that no localised controls are used in the process. |
| Personal protective equipment (PPE)   | Loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air. Consumers are advised to wear protective clothing, however, the worst case assumption is that no localised controls are used in the process. |
| Other risk management measures related to workers   | No further risk management measures required  |
| <b>Section 2.2 Control of environmental exposure</b>  |   |

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|  |   |
|--|---|
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)                       |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 2.500 t/y (worst case site)   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )        |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |   |
| For this wide dispersive use particular risk management measures are not needed to demonstrate environmental safe use.       |   |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 34,2 kg/d (based on worst case estimated emission to waste waters identified)                   |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances   | None  |
| Type of external treatment aiming at final disposal of the waste   | Degradation in the STP into constituent ions. These are non hazardous.                          |
| Fraction of substance released into the environment via air from waste handling  | n.a.  |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.  |
| Fraction of substance disposed of as secondary waste   | n.a.  |
| <b>Section 3 Exposure estimation</b>   |   |
| <b>3.1 Health</b>  |   |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |   |
|  | Parameter   |
| Molecular weight   | 98,08 g/ mol  |
| Vapour pressure  | 214 Pa (for dilute electrolyte solution - based on data for the most dilute mixture available). |
| Is the substance a solid?  | No: liquid  |
| Dustiness during process   | n.a.  |
| Duration of activity   | From 15 mins to 1 hour  |
| Use of ventilation   | Indoors without LEV   |
| The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for risk                    |   |

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characterisation purposes.

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC | Parameters/assumptions   |
|-----------------------------------|------|--|
| Exposure duration                 | 19   | 240 mins exposure / day; 240 mins non-exposure/day   |
| Product type                      | 19   | Liquid (low viscosity – like water)  |
| Process temperature               | 19   | Room temperature (15-25°C)   |
| Vapour pressure                   | 19   | Substance is considered to be low volatile, exposure to mists is estimated                 |
| Liquid weight fraction            | 19   | 0,25   |
| Primary emission source proximity | 19   | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | 19   | Handling of contaminated objects   |
| Localized controls                | 19   | None   |
| Fugitive emission sources         | 19   | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | 19   | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                         | Value   | Unit   | ERC default (if applicable) |
|---|---|--------|-----------------------------|
| Molecular weight                        | 98,08   | g/mol  |                             |
| Vapour pressure at 20°C                 | 0,1   | hPa    |                             |
| Water solubility                        | miscible  | Mg/ml  |                             |
| Octanol/water partition coefficient     | -1  | LogKow |                             |
| Koc                                     | 1   |        |                             |
| Biodegradability                        | Not biodegradable   |        |                             |
| Life Cycle Step                         | Wide dispersive use   |        |                             |
| Environmental Release Class             | ERC 9b  |        |                             |
| Fraction of Tonnage for Region (1 Tier) |   |        | 1                           |
| STP                                     |   |        | Yes                         |
| Emission events per year                | 365 (chosen as it is likely that battery maintenance will be carried out at some site within the region on most days due to the small scale but wide dispersive nature of this use) | days   | 365                         |

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|  |       |              |                             |
|--|-------|--------------|-----------------------------|
| Default Release to Air                     | 5     | %            | 5                           |
| Default Release to water                   | 5     | %            | 5                           |
| Dilution factor applied for PEC derivation |       |              | 25 * 10 <sup>9</sup> m3/d   |
| Tonnage assessed                           | 2.500 | tonnes/ year | Estimate of single site use |

RMMs and measured values for tier 2 assessment.  
Not applicable (tier 2 assessment not necessary).

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**12. Use of sulphuric acid as laboratory chemicals**

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid as laboratory chemicals</b>  |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 22   |
| Product Category: (PC)  | 21   |
| Process Categories: (PROC)  | 15   |
| Environmental Release Category: (ERC)   | 8a, 8b   |
| <b>Covered processes and activities</b>   |  |
| It is covered the use of sulphuric acid as a laboratory chemical. These uses would be on a small scale R and D basis and would include use in buffers, in protein reagents and as acidification reagents. |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 6  |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | 98%  |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Worker exposure considered to be negligible due to specialised systems.  |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - these tasks rarely take a full 8hr / day so worst case is assumed.  |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a.   |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Uses would generally be on a smaller scale and would be expected to be highly contained. Laboratory workers involved in handling and use of sulphuric acid are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimise exposure and risks. |
| Personal protective equipment (PPE)   | Uses would generally be on a smaller scale and would be expected to be highly contained. Laboratory workers involved in handling and use of sulphuric acid are trained in the procedures and protective equipment is intended to cope with the worst case scenario, in order to minimise exposure and risks. |
| <b>Section 2.2 Control of environmental exposure</b>  |  |



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|  |  |
|--|--|
| <b>Product characteristics</b>   |  |
| Molecular weight   | 98,08  |
| Vapour pressure at 20°C (hPa)  | 0,1  |
| Water solubility   | Miscible   |
| Octanol/water partition coefficient  | -1 (logKow)  |
| Koc  | 1  |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)  |
| <b>Amount of use</b>   |  |
| Annual amount used per site  | 5.000 t/y (worst case site)  |
| <b>Frequency and duration of use</b>   |  |
| continuous production  |  |
| Emission days  | 365 d/y (based on continuous use in at least one site per day in any particular catchment - wide dispersive use) |
| <b>Other operational conditions affecting environmental exposure</b>   |  |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)   |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )                         |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |  |
| For this wide dispersive use particular risk management measures are not needed to demonstrate environmental safe use.       |  |
| <b>Fractions of substance in waste and waste management measures</b>   |  |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 1.370 kg/d (based on worst case emission to waste waters identified )  |
| Amount of substances in waste resulting from service life of articles  | n.a.   |
| Type of waste, suitable waste codes  | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances   | None   |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.  |
| Fraction of substance released into the environment via air from waste handling  | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.   |
| Fraction of substance disposed of as secondary waste   | n.a.   |
| <b>Section 3 Exposure estimation</b>   |  |
| <b>3.1 Health</b>  |  |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |  |
|  | Parameter  |
| Molecular weight   | 98,08 g/ mol   |
| Vapour pressure  | 6 Pa   |
| Is the substance a solid?  | No: liquid   |
| Dustiness during process   | n.a.   |
| Duration of activity   | From 15 mins to 1 hour   |
| Use of ventilation   | Indoors without LEV  |
| The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for risk                    |  |

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characterisation purposes.

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC | Parameters/assumptions   |
|-----------------------------------|------|--|
| Exposure duration                 | 15   | 240 mins exposure / day; 240 mins non-exposure/day   |
| Product type                      | 15   | Liquid (medium viscosity – like oil)   |
| Process temperature               | 15   | Room temperature (15-25°C)   |
| Vapour pressure                   | 15   | Substance is considered to be low volatile, exposure to mists is estimated                 |
| Liquid weight fraction            | 15   | 0,98   |
| Primary emission source proximity | 15   | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | 15   | Transfer of liquids  |
| Localized controls                | 15   | LEV  |
| Fugitive emission sources         | 15   | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | 15   | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                         | Value                    | Unit   | ERC default (if applicable) |
|---|--------------------------|--------|-----------------------------|
| Molecular weight                        | 98,08                    | g/mol  |                             |
| Vapour pressure at 20°C                 | 0,1                      | hPa    |                             |
| Water solubility                        | miscible                 | Mg/ml  |                             |
| Octanol/water partition coefficient     | -1                       | LogKow |                             |
| Koc                                     | 1                        |        |                             |
| Biodegradability                        | Not biodegradable        |        |                             |
| Life Cycle Step                         | Wide dispersive use      |        |                             |
| Environmental Release Class             | ERC 8a and 8b            |        |                             |
| Fraction of Tonnage for Region (1 Tier) |                          |        | 1                           |
| STP                                     |                          |        | Yes                         |
| Emission events per year                | 330                      | days   | 20                          |
| Default Release to Air                  | ERC8A: 100<br>ERC8B: 0,1 | %      | ERC8A: 100<br>ERC8B: 0,1    |
| Default Release to water                | ERC8A: 100<br>ERC8B: 2   | %      | ERC8A: 100<br>ERC8B: 2      |

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|  |       |              |                  |
|--|-------|--------------|------------------|
| Dilution factor applied for PEC derivation |       |              | 10 (20.000 m3/d) |
| Tonnage assessed                           | 5.000 | tonnes/ year |                  |

RMMs and measured values for tier 2 assessment.  
Not applicable (tier 2 assessment not necessary).

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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### 13. Use of sulphuric acid in industrial cleaning

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid in industrial cleaning</b>   |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 3  |
| Product Category: (PC)  | 35   |
| Process Categories: (PROC)  | 2, 5, 8a, 8b, 9, 10, 13  |
| Environmental Release Category: (ERC)   | 8a, 8b   |
| <b>Covered processes and activities</b>   |  |
| It is covered the use of sulphuric acid as a component or feedstock in heavy duty industrial cleaners. This use would not be very regular and would generally be used in cases of heavy industrial contamination. |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 214 (for dilute cleaning solution (based on data for the most dilute mixture available)  |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | 10% (Approximate concentration in cleaning products)   |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Sulphuric acid cleaning would not be required regularly. Amounts used would vary by requirements and by facility but would generally be many times less than those involved with industrial processes.   |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - these tasks rarely take a full 8hr / day so worst case is assumed.  |
| Respiration volume under conditions of use  | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use  | 480 cm <sup>2</sup> (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a.<br>Amounts used would vary by requirements and by facility but would generally be many times less than those involved with industrial processes.  |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air. Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves boots and protective overall). A safety shower is required nearby in case of accidental spillage. |
| Personal protective equipment (PPE)   | Loading and unloading of vessels of sulphuric acid for use in maintenance of batteries is usually performed in the open air. Workers wear protective clothing (face/eye protection, helmet, anti-acid gloves boots and protective overall). A safety shower is required nearby in case of accidental spillage. |
| <b>Section 2.2 Control of environmental exposure</b>  |  |

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|  |  |
|--|--|
| <b>Product characteristics</b>   |  |
| Molecular weight   | 98,08  |
| Vapour pressure at 20°C (hPa)  | 0,1  |
| Water solubility   | Miscible   |
| Octanol/water partition coefficient  | -1 (logKow)  |
| Koc  | 1  |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)                |
| <b>Amount of use</b>   |  |
| Annual amount used per site  | 5.000 t/y (worst case site)  |
| <b>Frequency and duration of use</b>   |  |
| continuous production  |  |
| Emission days  | 365 d/y (wide dispersive use)  |
| <b>Other operational conditions affecting environmental exposure</b>   |  |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)                                   |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. ) |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                                     |  |
| For this wide dispersive use particular risk management measures are not needed to demonstrate environmental safe use.       |  |
| <b>Fractions of substance in waste and waste management measures</b>   |  |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario                          | 1.370 kg/d (based on worst case emission to waste waters identified )                    |
| Amount of substances in waste resulting from service life of articles  | n.a.   |
| Type of waste, suitable waste codes  | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances   | None   |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.  |
| Fraction of substance released into the environment via air from waste handling  | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling                                      | n.a.   |
| Fraction of substance disposed of as secondary waste   | n.a.   |
| <b>Section 3 Exposure estimation</b>   |  |
| <b>3.1 Health</b>  |  |
| ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.<br>ECETOC TRA Model input parameters: |  |
|  | Parameter  |
| Molecular weight   | 98,08 g/ mol   |
| Vapour pressure  | 214 Pa   |
| Is the substance a solid?  | No: liquid   |
| Dustiness during process   | n.a.   |
| Duration of activity   | 4 h (worst case)   |
| Use of ventilation   | Indoors with LEV   |
| Substance in preparation   | 1-5%   |
| The ECETOC exposure estimation is considered to be unsatisfactory and is not considered relevant for risk                    |  |

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characterisation purposes.

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.

ART Model input parameters:

|                                   | PROC              | Parameters/assumptions   |
|-----------------------------------|-------------------|--|
| Exposure duration                 | All               | 480 mins   |
| Product type                      | All               | Liquid (low viscosity – like water)  |
| Process temperature               | All               | Room temperature (15-25°C)   |
| Vapour pressure                   | All               | Substance is considered to be low volatile, exposure to mists is estimated                 |
| Liquid weight fraction            | All               | 0,1  |
| Primary emission source proximity | All               | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre) |
| Activity class                    | 2, 8a, 8b, 9      | Transfer of liquids  |
|                                   | 5, 13             | Activities with open liquid surface or reservoirs  |
|                                   | 10                | Spreading of liquid products   |
| Containment                       | 2, 8a, 9          | Handling reduces contact between product and adjacent air                                  |
|                                   | 5, 8b, 10, 13     | n.a.   |
| Localized controls                | 2, 5              | LEV  |
|                                   | 8a, 8b, 9, 10, 13 | None   |
| Fugitive emission sources         | All               | Not fully enclosed – effective housekeeping practices in place.                            |
| Dispersion                        | All               | Indoors, any sized room, only good natural ventilation                                     |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories, except:

- PROC 10: need of breathing system protection with at least 95% of efficiency, both for short and long term exposure,
- PROC 5: need of breathing system protection with at least 95% of efficiency for long term exposure.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.

Tier 1 assessment resulted a not realistic exposition.

Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                     | Value               | Unit   | ERC default (if applicable) |
|-------------------------------------|---------------------|--------|-----------------------------|
| Molecular weight                    | 98,08               | g/mol  |                             |
| Vapour pressure at 20°C             | 0,1                 | hPa    |                             |
| Water solubility                    | miscible            | Mg/ml  |                             |
| Octanol/water partition coefficient | -1                  | LogKow |                             |
| Koc                                 | 1                   |        |                             |
| Biodegradability                    | Not biodegradable   |        |                             |
| Life Cycle Step                     | Wide dispersive use |        |                             |

**SULFURIC ACID 98%**

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|  |                          |              |                          |
|--|--------------------------|--------------|--------------------------|
| Environmental Release Class                | ERC 8a and 8b            |              |                          |
| Fraction of Tonnage for Region (1 Tier)    |                          |              | 1                        |
| STP  |                          |              | Yes                      |
| Emission events per year                   | 330                      | days         | 20                       |
| Default Release to Air                     | ERC8A: 100<br>ERC8B: 0,1 | %            | ERC8A: 100<br>ERC8B: 0,1 |
| Default Release to water                   | ERC8A: 100<br>ERC8B: 2   | %            | ERC8A: 100<br>ERC8B: 2   |
| Dilution factor applied for PEC derivation |                          |              | 10 (20.000 m3/d)         |
| Tonnage assessed                           | 5.000                    | tonnes/ year |                          |

RMMs and measured values for tier 2 assessment.  
Not applicable (tier 2 assessment not necessary).

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**14. Mixing, preparation and repackaging of sulphuric acid**

|   |  |
|---|--|
| <b>Section 1: Title of exposure scenario</b>  |  |
| <b>Short title of the exposure scenario: Mixing, preparation and repackaging of sulphuric acid</b>  |  |
| <b>Title systematically based on the use of descriptors</b>   |  |
| Sector of Use: (SU)   | 3, 10  |
| Product Category: (PC)  | n/a  |
| Process Categories: (PROC)  | 1, 3, 5, 8a, 8b, 9   |
| Environmental Release Category: (ERC)   | 2  |
| <b>Covered processes and activities</b>   |  |
| It encompasses the use sulphuric acid during mixing, repackaging, preparation and in the production of Oleum. Oleum is produced using sulphur trioxide which is dissolved in concentrated sulphuric acid. |  |
| <b>Evaluation methodology</b>   |  |
| Refer to section 3  |  |
| <b>Section 2 Operational conditions and risk management measures</b>  |  |
| <b>Section 2.1 Control of worker exposure</b>   |  |
| <b>Product Characteristics</b>  |  |
| Physical state  | Liquid   |
| Vapour pressure (Pa)  | 6  |
| Molecular weight  | 98,08  |
| Concentration of substance in product   | 98%  |
| <b>Operational conditions</b>   |  |
| Use amount per worker [workplace] per day   | Worker exposure considered to be negligible due to specialised systems.  |
| Frequency at workplace  | 220 d/year   |
| Duration per day at workplace [for one worker]  | 8hr/d  |
| Other determinants related to duration, frequency and amount of use   | Intermittent contact is expected - These tasks rarely take a full 8hr / day so worst case is assumed.  |
| Respiration volume under conditions of use  | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use  | 480 cm2 (ECETOC default).<br>Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.   |
| Room size and ventilation rate  | n.a. (not relevant as workers work in a control room, with no direct contact to the installations housing the material)  |
| <b>Specific Risk management measures</b>  |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required   | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors.  |
| Personal protective equipment (PPE)   | Production and handling of sulphuric acid involves special equipment and high integrity contained systems with little or no potential for exposure. Facilities involved in the production and uses of sulphuric acid are usually housed outdoors. 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 minimise exposure and risks. |
| Other risk management measures  | A safety shower is required nearby loading and unloading areas in case of  |



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| related to workers   | accidental spillage.  |
| <b>Section 2.2 Control of environmental exposure</b>   |   |
| <b>Product characteristics</b>   |   |
| Molecular weight   | 98,08   |
| Vapour pressure at 20°C (hPa)  | 0,1   |
| Water solubility   | Miscible  |
| Octanol/water partition coefficient  | -1 (logKow)   |
| Koc  | 1   |
| Biodegradability   | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)   |
| <b>Amount of use</b>   |   |
| Annual amount used per site  | 300.000 t/y   |
| Annual amount used per regione   | 3.000.000 t/y   |
| <b>Frequency and duration of use</b>   |   |
| continuous production  |   |
| Emission days  | 365 d/y   |
| <b>Other operational conditions affecting environmental exposure</b>   |   |
| Discharge volume of sewage treatment plant   | 2000 m3/d (EUSES default value for standard local STP)  |
| Available river water volume to receive the emissions from a site  | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )  |
| <b>Risk management measures related to environmental emissions from industrial sites</b>                       |   |
| Onsite pre-treatment of waste water  | Waste waters are generally treated on site by chemical neutralisation methods before release to the municipal STP or to the environment.  |
| Resulting fraction of initially applied amount in waste water released from site to the external sewage system | The neutralisation process is extremely efficient and pH monitors are in place to ensure that complete neutralisation and removal have taken place.                                       |
| Air emission abatement   | Treated by scrubbers.   |
| Resulting fraction of applied amount in waste gas released to environment                                      | 99% of waste gas removed by scrubber  |
| Onsite waste treatment   | The waste water neutralisation process is extremely efficient with almost total neutralisation achieved. pH alarms are in place to ensure that successful neutralisation has taken place. |
| Effluent (of the waste water treatment plant) discharge rate   | 2000 m3/ d (default value)  |
| Recovery of sludge for agriculture or horticulture   | No<br>All sludge is collected and incinerated or sent to landfill.  |
| <b>Fractions of substance in waste and waste management measures</b>   |   |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario            | 0 kg/d (value based on the specialised waste water treatment procedures)  |
| Amount of substances in waste resulting from service life of articles  | n.a.  |
| Type of waste, suitable waste codes  | Suitable EWC code(s)  |
| Type of external treatment aiming at recycling or recovery of substances                                       | None  |
| Type of external treatment aiming at final disposal of the waste   | Incineration or landfill.   |
| Fraction of substance released into the environment via air from waste handling                                | n.a.  |

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| Fraction of substance released into the environment via waste water from waste handling | n.a. |
| Fraction of substance disposed of as secondary waste                                    | n.a. |

**Section 3 Exposure estimation**

**3.1 Health**

ECETOC TRA model to conduct a Tier 1 assessment of inhalation exposure concentrations.  
ECETOC TRA Model input parameters:

|                           | Parameter           |
|---------------------------|---------------------|
| Molecular weight          | 98,08 g/ mol        |
| Vapour pressure           | 6 Pa                |
| Is the substance a solid? | No: liquid          |
| Dustiness during process  | n.a.                |
| Duration of activity      | > 4 h               |
| Use of ventilation        | Indoors without LEV |

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

ART model to conduct a Tier 2 assessment of inhalation exposure concentrations.  
ART Model input parameters:

|                                   | PROC               | Parameters/assumptions   |
|-----------------------------------|--------------------|--|
| Exposure duration                 | All                | 480 mins   |
| Product type                      | All                | Liquid (medium viscosity – like oil)   |
| Process temperature               | 1, 3               | Hot processes (50-150°C)   |
|                                   | 5, 8a, 8b, 9       | Room temperature (15-25°C)   |
| Vapour pressure                   | All                | 6 Pa (Substance is considered to be low volatile, exposure to mists is estimated)                          |
| Liquid weight fraction            | All                | 0,98   |
| Primary emission source proximity | 1                  | Primary emission source is not located in the breathing zone of the worker (workers are in a control room) |
|                                   | 3, 5, 8a, 8b, 9    | Primary emission source located in the breathing zone of the workers (i.e. Within 1 metre)                 |
| Activity class                    | 1, 3, 5, 8a, 8b, 9 | Trasferimento di prodotti liquidi  |
| Containment                       | 1, 3, 9            | Handling reduces contact between product and adjacent air  |
|                                   | 5, 8a, 8b          | n.a.   |
| Localized controls                | 1, 3, 8b           | Vapour recovery system, LEV  |
|                                   | 2, 9               | Vapour recovery  |
|                                   | 8a                 | None   |
|                                   | 5                  | LEV  |
| Segregation                       | 1                  | Complete segregation of workers in separate control room   |
| Fugitive emission sources         | 1, 3, 8b, 9        | Process fully enclosed – not breached for sampling   |
|                                   | 5, 8a              | Not fully enclosed – effective housekeeping practices in place.  |

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|            |           |  |
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| Dispersion | 1, 8a, 8b | Outdoors not close to buildings                        |
|            | 3         | Outdoors near to buildings                             |
|            | 5, 9      | Indoors, any sized room, only good natural ventilation |

The estimated short and long-term concentrations are lower than relevant DNEL for all process categories.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.  
Tier 1 assessment resulted a not realistic exposition.  
Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value             | Unit         | ERC default (if applicable)       |
|--|-------------------|--------------|-----------------------------------|
| Molecular weight                           | 98,08             | g/mol        |                                   |
| Vapour pressure at 20°C                    | 0,1               | hPa          |                                   |
| Water solubility                           | miscible          | Mg/ml        |                                   |
| Octanol/water partition coefficient        | -1                | LogKow       |                                   |
| Koc  | 1                 |              |                                   |
| Biodegradability                           | Not biodegradable |              |                                   |
| Life Cycle Step                            | Industrial use    |              |                                   |
| Environmental Release Class                | ERC 2             |              |                                   |
| Fraction of Tonnage for Region (1 Tier)    |                   |              | 1                                 |
| STP  |                   |              | Yes                               |
| Emission events per year                   | 330               | days         | 20                                |
| Default Release to Air                     | 2,5               | %            | 2,5                               |
| Default Release to water                   | 2                 | %            | 2                                 |
| Dilution factor applied for PEC derivation |                   |              | 10 (20.000 m3/d)                  |
| Regional Tonnage                           | 3.000.000         | tonnes/ year |                                   |
| Tonnage assessed                           | 300.000           |              | Worst case site formulation value |

RMMs and measured values for tier 2 assessment.

| Description of RMM     | Details   | Effect taken into account in EUSES   | Comments  |
|------------------------|---|--|---|
| No loss to waste water | 0 mg/l  | Lowering of concentration in STP effluent to 0 mg/L due to the very efficient neutralization process | Total neutralization to around pH 7.                |
| Emission days          | 365 emission days per year                          | Increase emission days by 20%.   | Continuous production                               |
| Sludge removal         | Sludge removed and sent to landfill or incinerated. | Concentration in soil due to sludge spreading set to 0.  | No contamination of grassland or agricultural soil. |
| Gas                    | Waste gas scrubbing                                 | Reduction of emission to   | Based on scrubbing and gas removal.                 |

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| scrubbing | removes 99% of the emitted sulphur oxides | atmosphere | The values used in still considerably higher than the highest measured emission and should be considered conservative. |
|-----------|---|------------|--|

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
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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**15. Use of sulphuric acid as a drain cleaner (Professional)**

|  |  |
|--|--|
| <b>Section 1: Title of exposure scenario</b>   |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid as a drain cleaner</b>  |  |
| <b>Title systematically based on the use of descriptors</b>  |  |
| Sector of Use: (SU)  | 22   |
| Product Category: (PC)   | 35   |
| Process Categories: (PROC)   | 8a   |
| Environmental Release Category: (ERC)  | 8a   |
| <b>Covered processes and activities</b>  |  |
| Use of sulfuric acid as an agent for clogged drain cleaning deriving from chemically removable obstructions. It is assumed that the use of the indicated quantity of product is carried out through pouring it by a vessel (bottle) without applying pressure or orifices that allow the aerosols formation.<br>To be conservative using the product in an enclosed space without air spare it is considered the worst case. |  |
| <b>Evaluation methodology</b>  |  |
| Refer to section 3   |  |
| <b>Section 2 Operational conditions and risk management measures</b>   |  |
| <b>Section 2.1 Control of worker exposure</b>  |  |
| <b>Product Characteristics</b>   |  |
| Physical state   | Liquid   |
| Vapour pressure (Pa)   | 6  |
| Molecular weight   | 98,08  |
| Concentration of substance in product  | Covers percentage substance in the product up to 98% (before addition to the drain)  |
| <b>Operational conditions</b>  |  |
| Use amount per worker [workplace] per day  | No data (not applicable as this task is carried out sporadically by the consumer)  |
| Frequency at workplace   | 220 days / year (In conservative way is considered the N° standard annual working days)  |
| Duration per day at workplace [for one worker]   | 8hr/d (In conservative way is considered the N° standard working hours per day)  |
| Other determinants related to duration, frequency and amount of use  | There may be sporadic contact - The cleaning of drains using sulfuric acid is rarely done.   |
| Respiration volume under conditions of use   | 10 m3/d (default value for a worker breathing for a 8hrs work day)   |
| Skin contact area with the substance under conditions of use   | Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.      |
| Room size and ventilation rate   | Pouring of vessels of sulphuric acid for use as a drain cleaner usually performed indoors.   |
| <b>Specific Risk management measures</b>   |  |
| Containment plus good work practice required<br>Local exhaust ventilation if required  | Pouring of bottles of sulphuric acid for use as a drain cleaner is usually indoors and no specific LEV is required.  |
| Personal protective equipment (PPE)  | Only basic dermal protection is required. It is recommended to wear adequate clothing, eye protection and gloves in order to prevent any exposure during the product handling. |
| Other risk management measures related to workers  | None   |
| <b>Section 2.2 Control of environmental exposure</b>   |  |

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|   |  |
|---|--|
| <b>Product characteristics</b>  |  |
| Molecular weight  | 98,08  |
| Vapour pressure at 20°C (hPa)   | 0,1  |
| Water solubility  | Miscible   |
| Octanol/water partition coefficient   | -1 (logKow)  |
| Koc   | 1  |
| Biodegradability  | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)  |
| <b>Amount of use</b>  |  |
| Annual amount used per site   | 1 kg per use   |
| <b>Frequency and duration of use</b>  |  |
| continuous production   |  |
| Emission days   | 365 d/y<br>It is likely that these applications are carried out infrequently and so the effect of a single treatment of 1 kg per day over 365 days per year to a single STP is assessed. |
| <b>Other operational conditions affecting environmental exposure</b>  |  |
| Discharge volume of sewage treatment plant  | 2000 m3/d (EUSES default value for standard local STP)   |
| Available river water volume to receive the emissions from a site   | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )   |
| <b>Risk management measures related to environmental emissions from industrial sites</b>  |  |
| No specific RMMS are required beyond the intended application details and function of the product.  |  |
| <b>Fractions of substance in waste and waste management measures</b>  |  |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario   | 1 kg/d   |
| Amount of substances in waste resulting from service life of articles   | n.a.   |
| Type of waste, suitable waste codes   | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances  | None   |
| Type of external treatment aiming at final disposal of the waste  | None (emission to drains)  |
| Fraction of substance released into the environment via air from waste handling   | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling   | n.a.   |
| Fraction of substance disposed of as secondary waste  | n.a.   |
| <b>Section 3 Exposure estimation</b>  |  |
| <b>3.1 Health</b>   |  |
| The exposure assessment has been carried out by sampling based on possible drain cleaner sulfuric acid use scenarios. Therefore vapors dispersion was measured during use in different conditions and quantities through 7903 NIOSH method. The measure had effective results as recommended by drain cleaner producer. |  |
| More conservative sampling parameters used  |  |
|   | Parameter  |
| Molecular weight  | 98,08 g/ mol   |
| Vapour pressure   | 6 Pa (concentrated drain cleaner)  |
| Is the substance a solid?   | No: liquid   |
| Dustiness during process  | n.a.   |

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|                      |  |
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| Duration of activity | Up 25 minutes into the sink; up to 30 minutes in the toilet.                               |
| Environment          | Local equipped with special utilities for use, the square footage of between 7.5 and 9 m3. |
| Use of ventilation   | Indoor no local exhaust (LEV) and no windows.  |
| Quantity             | To 250 ml in the sink; up in 750 ml water.   |

The measured inhalation exposures have undercut the chronic and acute DNEL. Therefore, no respiratory protection is required for this use.

**3.2 Environment**

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.  
Tier 1 assessment resulted a not realistic exposition.  
Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value                      | Unit   | ERC default (if applicable)   |
|--|----------------------------|--------|---|
| Molecular weight                           | 98,08                      | g/mol  |   |
| Vapour pressure at 20°C                    | 0,1                        | hPa    |   |
| Water solubility                           | miscible                   | Mg/ml  |   |
| Octanol/water partition coefficient        | -1                         | LogKow |   |
| Koc  | 1                          |        |   |
| Biodegradability                           | Not biodegradable          |        |   |
| Life Cycle Step                            | Industrial use             |        |   |
| Environmental Release Class                | ERC 8a                     |        |   |
| Fraction of Tonnage for Region (1 Tier)    |                            |        | 1   |
| STP  |                            |        | Yes   |
| Emission events per year                   | 365                        | days   | 100   |
| Default Release to Air                     | 0                          | %      | 100   |
| Default Release to water                   | 100                        | %      | 100   |
| Dilution factor applied for PEC derivation |                            |        | 10 (20.000 m3/d)  |
| Tonnage assessed                           | EU: 1.800<br>Regional: 10% | t/y    | For this indoor wide dispersive the local main source fraction is set to 0.2% |

RMMs and measured values for tier 2 assessment.  
No additional specific RMMs are required, apart from the details concerning the adequate use of the product.

All estimated concentrations are lower than relevant DNEL.

**Section 4 Guidance to check compliance with exposure scenario**

**4.1 Health**

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks

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are managed to at least equivalent levels.

**4.2 Environment**

Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.

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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**16. Use of sulphuric acid as a drain cleaner (Consumers)**

|  |  |
|--|--|
| <b>Section 1: Title of exposure scenario</b>   |  |
| <b>Short title of the exposure scenario: Use of sulphuric acid as a drain cleaner</b>  |  |
| <b>Title systematically based on the use of descriptors</b>  |  |
| Sector of Use: (SU)  | 21   |
| Product Category: (PC)   | 35   |
| Process Categories: (PROC)   | n.a.   |
| Environmental Release Category: (ERC)  | 8a   |
| <b>Covered processes and activities</b>  |  |
| Use of sulfuric acid as an agent for clogged drain cleaning deriving from chemically removable obstructions. It is assumed that the use of the indicated quantity of product is carried out through pouring it by a vessel (bottle) without applying pressure or orifices that allow the aerosols formation.<br>To be conservative using the product in an enclosed space without air spare it is considered the worst case. |  |
| <b>Evaluation methodology</b>  |  |
| Refer to section 3   |  |
| <b>Section 2 Operational conditions and risk management measures</b>   |  |
| <b>Section 2.1 Control of worker exposure</b>  |  |
| <b>Product Characteristics</b>   |  |
| Physical state   | Liquid   |
| Vapour pressure (Pa)   | 6  |
| Molecular weight   | 98,08  |
| Concentration of substance in product  | Covers percentage substance in the product up to 98% (before addition to the drain)  |
| <b>Operational conditions</b>  |  |
| Use amount per worker [workplace] per day  | not applicable - a this task is carried out sporadically by the consumer   |
| Frequency at workplace   | A few days a year (a this task is carried out sporadically by the consumer)  |
| Duration per day at workplace [for one worker]   | 8hr/d (In conservative way is considered the N° standard working hours per day)  |
| Other determinants related to duration, frequency and amount of use  | Intermittent contact is expected - It is likely that these applications are carried out infrequently   |
| Respiration volume under conditions of use   | 10 m <sup>3</sup> /d (default value for a worker breathing for a 8hrs work day)  |
| Skin contact area with the substance under conditions of use   | Please note that due to the corrosive nature of sulphuric acid dermal exposure is not considered relevant for risk characterization as it must be prevented in all cases.      |
| Room size and ventilation rate   | Pouring of vessels of sulphuric acid for use as a drain cleaner usually performed indoors.   |
| <b>Specific Risk management measures</b>   |  |
| Local exhaust ventilation if not required  | The activity is generally carried out in closed environments, in rooms of standard dimensions. Specific air intake system is not required.                                     |
| Personal protective equipment (PPE)  | Only basic dermal protection is required. It is recommended to wear adequate clothing, eye protection and gloves in order to prevent any exposure during the product handling. |
| Other risk management measures related to workers  | None   |
| <b>Section 2.2 Control of environmental exposure</b>   |  |
| <b>Product characteristics</b>   |  |
| Molecular weight   | 98,08  |
| Vapour pressure at 20°C (hPa)  | 0,1  |

**SULFURIC ACID 98%**

|                |            |              |           |               |                   |
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|   |  |
|---|--|
| Water solubility  | Miscible   |
| Octanol/water partition coefficient   | -1 (logKow)  |
| Koc   | 1  |
| Biodegradability  | Not biodegradable<br>(inorganic acids cannot be considered biodegradable)  |
| <b>Amount of use</b>  |  |
| Annual amount used per site   | 1 kg per use   |
| <b>Frequency and duration of use</b>  |  |
| continuous production   |  |
| Emission days   | 365 d/y<br>It is likely that these applications are carried out infrequently and so the effect of a single treatment of 1 kg per day over 365 days per year to a single STP is assessed. |
| <b>Other operational conditions affecting environmental exposure</b>  |  |
| Discharge volume of sewage treatment plant  | 2000 m3/d (EUSES default value for standard local STP)   |
| Available river water volume to receive the emissions from a site   | 20.000 m3/d (Standard ERC flow rate leading to a 10 fold dilution in receiving waters. )   |
| <b>Risk management measures related to environmental emissions from industrial sites</b>  |  |
| No specific RMMs are required beyond the intended application details and function of the product.  |  |
| <b>Fractions of substance in waste and waste management measures</b>  |  |
| Amount of substances in waste water resulting from identified uses covered in the exposure scenario   | 1 kg/d   |
| Amount of substances in waste resulting from service life of articles   | n.a.   |
| Type of waste, suitable waste codes   | Suitable EWC code(s)   |
| Type of external treatment aiming at recycling or recovery of substances  | None   |
| Type of external treatment aiming at final disposal of the waste  | None (emission to drains)  |
| Fraction of substance released into the environment via air from waste handling   | n.a.   |
| Fraction of substance released into the environment via waste water from waste handling   | n.a.   |
| Fraction of substance disposed of as secondary waste  | n.a.   |
| <b>Section 3 Exposure estimation</b>  |  |
| <b>3.1 Health</b>   |  |
| The exposure assessment has been carried out by sampling based on possible drain cleaner sulfuric acid use scenarios. Therefore vapors dispersion was measured during use in different conditions and quantities through 7903 NIOSH method. The measure had effective results as recommended by drain cleaner producer. |  |
| More conservative sampling parameters used  |  |
|   | Parameter  |
| Molecular weight  | 98,08 g/ mol   |
| Vapour pressure   | 6 Pa (concentrated drain cleaner)  |
| Is the substance a solid?   | No: liquid   |
| Dustiness during process  | n.a.   |
| Duration of activity  | Up 25 minutes into the sink; up to 30 minutes in the toilet.   |
| Environment   | Local equipped with special utilities for use, the square  |

## SULFURIC ACID 98%

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|                    |   |
|--------------------|---|
|                    | footage of between 7.5 and 9 m3.              |
| Use of ventilation | Indoor no local exhaust (LEV) and no windows. |
| Quantity           | To 250 ml in the sink; up in 750 ml water.    |

The measured inhalation exposures have undercut the chronic and acute DNEL. Therefore, no respiratory protection is required for this use.

### 3.2 Environment

Tier 1 assessment has been carried out applying EUSES model with standard input data and ERC.  
Tier 1 assessment resulted a not realistic exposition.  
Tier 2 assessment has been carried out applying EUSES model; refined inputs are chosen to best suit the description of the production and uses of sulphuric acid.

EUSES model input parameters

| Input parameter                            | Value                      | Unit   | ERC default (if applicable)   |
|--|----------------------------|--------|---|
| Molecular weight                           | 98,08                      | g/mol  |   |
| Vapour pressure at 20°C                    | 0,1                        | hPa    |   |
| Water solubility                           | miscible                   | Mg/ml  |   |
| Octanol/water partition coefficient        | -1                         | LogKow |   |
| Koc  | 1                          |        |   |
| Biodegradability                           | Not biodegradable          |        |   |
| Life Cycle Step                            | use distributed            |        |   |
| Environmental Release Class                | ERC 8a                     |        |   |
| Fraction of Tonnage for Region (1 Tier)    |                            |        | 1   |
| STP  |                            |        | Yes   |
| Emission events per year                   | 365                        | days   | 100   |
| Default Release to Air                     | 0                          | %      | 100   |
| Default Release to water                   | 100                        | %      | 100   |
| Dilution factor applied for PEC derivation |                            |        | 10 (20.000 m3/d)  |
| Tonnage assessed                           | EU: 1.800<br>Regional: 10% | t/y    | For this indoor wide dispersive the local main source fraction is set to 0.2% |

RMMs and measured values for tier 2 assessment.  
No additional specific RMMs are required, apart from the details concerning the adequate use of the product.

All estimated concentrations are lower than relevant PNEC.

### Section 4 Guidance to check compliance with exposure scenario

#### 4.1 Health

Estimated workplace exposures are not expected to exceed DNELs when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 3.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

#### 4.2 Environment

**SULFURIC ACID 98%**

|                |            |              |           |               |                   |
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Estimated exposures are not expected to exceed PNEC when the identified Risk Management Measures/Operational Conditions are adopted, as indicated in Section 2.  
Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.