Title : **ELECTROLYTE - SULPHURIC ACID**

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

1.1 Product identifier

Commercial name	Code 01 30-42 % Sulphuric acid (Sulphuric acid, electrolyte for batteries) The supplier must indicate the concentration of solution in percentage on the label. The concentration expressed in percentage is always understood as weight/weight, unless otherwise indicated
Chemical name	**SULPHURIC ACID**
EC number	231-639-5
CAS number	7664-93-9
Index number	016-020-00-8
REACH registration number	01-2119458838-20-0185

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

Identified uses (see the corresponding exposure scenario, attached to this SDS)	Professional use Use of sulphuric acid in the maintenance of batteries containing sulphuric acid Use of batteries containing sulphuric acid
Uses advised against	Any use involving the formation of aerosol, vapour release or the risk of splashes to eyes/skin to which workers without protection for the respiratory tracts, eyes or skin are exposed

1.3 Details of the supplier of the safety data sheet

Manufacturer	FIAMM Energy Technology S.p.A. Viale Europa, 75 I - 36075 Montecchio Maggiore (Vicenza) Tel. +390444709311; Fax +390444699237
e-mail of the person responsible for the SDS	sdp@fiamm.com

1.4 Emergency telephone number

Emergency CONTACT (24-Hour-Number):GBK GmbH +49 (0)6132-84463

For urgent information please contact

Poison Control Centres (PCC) open 24/7:	Emergency Action: In the event of a medical enquiry involving this product, please contact your doctor or local hospital accident and emergency department

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Pursuant to the EC Regulation 1272/2008 (CLP)

Hazard Classification/Statements	Corrosive to the skin (cat. 1A) Causes severe skin burns and eye damage H314

Other information

Advice for man and the environment. The sulphuric acid has a corrosive effect on human tissues, with the possibility of damaging the respiratory tracts, the eyes, skin and intestine. Environmental effects may occur locally due to the pH.

2.2 Label elements

Labelling pursuant to Regulation 1272/2008 (CLP)

Danger symbols

Hazard statement		Hazard
Hazard statements	H314	Causes severe skin burns and eye damage
Precautionary statements	P260	Do not breathe fume, mist and vapours.
	P280	Wear protective gloves/protective clothing/eye protection/face protection
	P301+P330+P331	IF SWALLOWED: rinse mouth. Do NOT induce vomiting
	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): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
	P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing
	P310	Immediately call a POISON CENTRE or doctor
	P405	Store locked up
	P501	Dispose of the product and the container in companies authorised to recycle or dispose of waste

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2.3 Other hazards

PBT/vPvB criteria	The substance is not deemed to be persistent, bio-accumulative or toxic (PBT)
Other hazards	Not known

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Pursuant to the REACH Regulation, the product is a single component and is not included in the list of SVHC substances

Chemical name	Name IUPAC	CAS No.:	EC no.	Index no.	REACH no.	Purity	Classification
Sulphuric acid	sulfuric acid	7664-93-9	231-639-5	- 016-020-00-8	01-2119458838-20-0185	>15% <100%	Skin Corr.1A, H314

For the Sulphuric acid substance, the specific concentration limits (derived from Annex VI of

Reg. (EC) 1272/2008 CLP) are indicated below, as they are key elements regarding the substance classification:

Eye Irrit. 2; H319: 5 % ≤ C < 15 %

Skin Corr. 1A; H314: C ≥ 15 %

Skin Irrit. 2; H315: 5 % ≤ C < 15 %

Classification note (Annex VI of Reg. (EC) 1272/2008 CLP): Note B

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice	In case of exposure or illness, call a POISON CENTRE or a doctor. Show this safety data sheet to the visiting doctor. If on SKIN (or hair): take off all contaminated clothing immediately. Rinse skin with water/shower. Move away from the hazard area. In case of INHALATION: bring the victim out in the open air and them at rest in a position that favours breathing.
Contact with eyes	Wash eyes immediately with plenty of running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if easy to do. Get medical advice if the irritation increases and persists.
Contact with skin	Thoroughly wash the affected area of the skin with plenty of water for at least 10 minutes and remove contaminated clothing and shoes. Get medical advice if the irritation increases and persists.
Ingestion	Get medical advice if the victim feels ill. Wash the mouth with plenty of water and give plenty of water to drink. Do not induce vomiting. Never administer anything orally to an unconscious person. Get medical advice if the symptoms persist.
Inhalation	Take the victim outdoors immediately if adverse effects occur (e.g. dizziness, drowsiness or respiratory tract irritation). If the victim is not breathing, perform artificial respiration or if breathing is difficult, administer oxygen and consult medical advice. Do not practice mouth-to-mouth respiration.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms	The substance is severely corrosive to the eyes, mucous membranes and exposed skin parts
Risks	Causes severe skin burns and eye damage

4.3 Indication of any immediate medical attention and special treatment needed

Take off all contaminated clothing immediately. Rinse skin with water/shower. Move away from the hazard area.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable	Any extinguishing media, however adequate to the circumstances (e.g. in case of fire with product leakage, do not use water but carbon dioxide or dry agent)
Unsuitable	There are no known restrictions

5.2 Special hazards arising from the substance or mixture

The product is not flammable and does not support combustion. Move away from containers and cool them with water from a protected position. The product reacts with most metals producing explosive hydrogen gas and sulphur oxides. Sulphuric acid readily dissociates in water, thereby forming hydrated protons and sulphur ions.

5.3 Advice for firefighters

In case of uncontrolled spills or discharges in waterways immediately notify the competent local authorities (e.g. Environmental Agency AUSL (Local Health Authority), etc.). Collect (dry) with inert and non-combustible materials, then rinse the area with water. The collected substance must be stored in sealed containers and delivered for disposal according to local regulations. Protective equipment for fire-fighters: gas masks with universal filter or breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Do not take any action that involves any personal risk or without appropriate training. Move unnecessary and unprotected personnel away. Do not touch or walk on spilled material. Do not breathe the vapours or mist. Provide suitable ventilation indoors. Wear adequate protective equipment (see paragraph 8). Avoid the formation of aerosol and dispersion due to wind. Ensure adequate ventilation. Avoid contact with eyes, skin and clothing.

6.2 Environmental precautions

Prevent material entering surface waters or sewage systems. Do not discharge directly into a water source. In case of accidental spillage or dispersion in sewers or waterways, contact the local authorities.

6.3 Methods and material for containment and cleaning up

For recovery or disposal, vacuum or clean and place in appropriate labelled container. Clean the affected area with plenty of water. Avoid dispersal in the wind. Residual traces can be swept away. If you want to neutralise the substance, use sodium carbonate, sodium bicarbonate and sodium hydroxide with caution.

6.4 Reference to other sections
See section 8 (personal protective equipment) and section 13 (waste disposal).

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Technical measures/precautions	Avoid contact with eyes, skin and clothing. Avoid the formation of mist and dispersion due to wind. Avoid contamination from any source and incompatible materials. Carefully clean the used equipment before performing maintenance or repairs.
General hygiene	Do not touch your eyes with your hands during use. Do not eat, drink or smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Carefully remove potentially contaminated clothing and wash it before reuse. Wash hands, arms and face after touching chemicals, before eating, smoking and using the lavatory and at the end of the work shift.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures / Storage methods	Store in the original container. Keep the sealed container in a cool, dry and well ventilated place. Keep the product away from heat (<40°C), from direct sunlight, away from incompatible materials (alkalis and oxidants) Materials suitable for packaging: plastic containers
Additional information	The product is stable but can be corrosive for metals Do not freeze If metal containers are used, make sure that they are protected inside against corrosion
Incompatible products	Alkalis and oxidants

7.3 Specific end use(s)

It is recommended to refer to the identified uses and exposure scenarios

SECTION 8: exposure controls/personal protection

8.1 Control parameters

Regulated occupational limit exposure values:

ACGIH 2017

TLV - TWA = 0.2 mg/m3 - Thoracic fraction.

Sulphuric acid: substance classified as A2 by ACGIH, suspected carcinogen for humans, the A2 classification refers to the sulphuric acid contained in strong inorganic acid mists

Directive 2009/161

OEL - EU

TLV - LT: Sulphuric acid (nebulisation) = 0.05 mg/m^3

VLEP (Italian Legislative Decree 81/08 Annex XXXVIII)

VLEP - ITA

TLV - LT: Sulphuric acid (nebulisation) = 0.05 mg/m^3

Limit exposure values for workers and consumers (following the chemical safety assessment performed)

Exposure model	Derivative levels without effects (DNEL)	
	Acute (15 minutes)	Long-term (8 hours)
Inhalation	0.1 mg/m^3	0.05 mg/m^3
Predicted No Effect Concentration (PNEC) in water		
Marine water	0.00025 mg/l	
Freshwater	0.0025 mg/l	
Sediments	$2*10^{-3}$ mg/kg wwt	
Marine water sediments	$2*10^{-3}$ mg/kg wwt	
wastewater treatment plants	8.8 mg/l	

8.2 Exposure controls

Suitable technical controls

Use adequate and effective ventilation. It is also good practice to have an eye wash facility and a safety shower near material storage and use systems. The exposure scenarios (attached) provide for a 360-day use per year.

Personal protective equipment, types of personal protective equipment

Respiratory protection	Provide extraction points (with air expulsion) where the material is transferred and in other open points. Discharge outside in a ventilated cabin with laminar airflow. Automate activity where possible. Wear a mask for acid vapours (e.g. DIN 3181 ABEK)
Hand protection	Anti-acid protective gloves (e.g. plastic, rubber) marked EN374 of class L.
Eye protection	Use protective goggles against the accidental penetration of liquids. Safety goggles

Skin and body protection	Body protection overalls. Choose the most adequate type according to the amount and concentration of the substance in the workplace
Other control measures	Handle in accordance with good industrial and safety hygiene. Do not eat or drink while working. Do not smoke while working. Wash hands before breaks and at the end of the working day. Provide appropriate first aid actions before starting to work with this product

Environmental exposure control

Do not discharge in open water or sanitary sewer systems.
Air: break down gas, fumes and/or dust with water.
Soil: avoid penetration underground.
Water: do not let the product in the drains.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Liquid (colourless if there are no impurities – up to dark brown)
Smell	absent
pH (20°C)	<0.3
Melting point	Variable depending on concentration (from –37°C at 65% to +11°C at 100%)
Boiling point	Variable depending on concentration (from 106°C at 25% to 315°C at 98%)
Flash point	Not relevant because the substance is an inorganic liquid
Flammability	Not flammable (depending on the molecular structure)
Vapour pressure	Variable depending on concentration (from 214 Pa at 65% to 6 Pa at 90% - to 20°C)
Relative density	>1835 kg/m³ (20 °C) (conc. at 100%)
Water solubility	Completely miscible at 20°C
N-octanol/water partition coefficient:	Slightly relevant because the substance is inorganic
Auto-ignition temperature	There is no auto-ignition
Dynamic viscosity	approx. 22.5 mPa.s at approx. 20 °C (conc. 95%)
Dissociation constant	approx. 1.9 pKa
Explosive properties	Not explosive
Oxidising properties	Non-oxidising

9.2 Other information
Nothing to report

SECTION 10: stability and reactivity

10.1 Reactivity
Stable under the conditions recommended for storage and handling

10.2 Chemical stability
Stable under the conditions recommended for storage and handling, reacts with strong oxidising agents and alkaline substances (bases)

10.3 Possibility of hazardous reactions
The product reacts with metals with highly flammable hydrogen development. The acid reacts violently with alkalis with heat development and the same when water is added.

10.4 Conditions to avoid
Any use that involves the formation of aerosol or the release of vapour above 0.05 mg/m³ where workers are exposed, without using adequate respiratory protection. Any use with risk of sprays on eyes/skin where workers are exposed, without adequate eye/skin protection.

10.5 Incompatible materials
Metals, fuels, alkalis, chlorates and hydrochloric acid.

10.6 Hazardous decomposition products
Sulphur oxides/hydrogen

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

The sulphuric acid is a strong, highly corrosive acid. The substance only causes local and non-systemic effects. In contact with water, the sulphuric acid rapidly dissociates almost completely, freeing the sulphur ion and the hydrogen ion which combines with water forming a hydrogen ion. Both ions (sulphur and hydrogen ion) are normally present in the human body.

Oral acute toxicity	LD_{50} oral rat 2140 mg/kg pc (OECD calculated data)
Skin acute toxicity	Data not available
Respiratory acute toxicity	Sulphuric acid causes severe irritation to eyes, mucous membranes and exposed skin parts. Data on aerosol substance: LC_{50}: (rat) 375 mg/m^3 LC_{50} (mouse – 4 hours of exposure): 0.85 mg/L air LC_{50} (mouse – 8 hours of exposure): 0.60 mg/L air LC_{50} (rabbit – 7 hours of exposure): 1.61 mg/L air Data on vapour substance: LC_{50}: (rat – 2 hours of exposure): 0.51 mg/L air LC_{50} (mouse – 2 hours of exposure): 0.32 mg/L air
Skin irritation	Corrosive
Eye irritation	Risk of serious damage to eyes (non-reversible)
Respiratory tract irritation	Can cause irritation of the respiratory tract
Skin sensitisation	Non-sensitising
Respiratory sensitisation	Non-sensitising
Repeated dose toxicity	Oral: No data available Skin: No data available Respiratory: Sub-chronic - NOAEC is 150 ppm for rats/mice, 30-90 days, 12-23.5 hours/day; Chronic – NOEC is 10 mg/m^3 for rats/mice, 6 months, 6 hours/day, 5 days/week.

Carcinogenicity	Insufficient data for classification. Rats treated with sulphuric acid showed slight signs of carcinogenicity, probably associated with chronic irritation to the respiratory tract
Mutagenicity	Negative
Reproductive toxicity	No data available, we have renounced to further analysis due to the typical properties of the sulphuric available

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

It is established that the water toxicity of sulphuric acid occurs if sufficient sulphuric acid is present to produce a very low pH (i.e. pH 3-5). Since the environmental exposure assessment shows insignificant changes in water pH levels depending on the product formulation and its intended use, it is deemed that there is no long-term risk to water organisms and, therefore, no data is required on chronic fish effects.

Fish (short term)	96-hours LC_{50}: 16-28 mg/l (pH 3.25-3.5)
Fish (long-term)	EC10/LC10 or NOEC: 0.025 mg/L
Daphnia magna (short-term)	48-hours EC_{50}: >100 mg/l (OECD 202)
Daphnia magna (long-term)	EC10/LC10 or NOEC: 0.15 mg/L
Algae	72-hours ErC_{50}: > 100 mg/l
M Factor	10
Inhibition of microbial activity	Data not available, as no form of soil exposure is expected

12.2 Persistence and degradability

Bio-degradation	The test cannot be performed because the substance is inorganic, nor is it expected that normal use can lead to a significant release of substance into the sea.
Hydrolysis	It is not possible to perform hydrolysis tests, it dissociates completely into ions

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	It is not significant because the substance is inorganic.
Bio-concentration factor (BCF)	Very low bio-accumulative potential, due to the substance properties

12.4 Mobility in soil

Absorption coefficient	It should not be relevant with regard to terrestrial mobility. If in contact with the ground, the absorption by soil particles is negligible. Depending on the soil buffer capacity, the H^+ ions will be neutralised in water of soil pores by organic or inorganic substances or the pH may decrease.

12.5 Results of PBT and vPvB assessment

The substance does not meet all criteria to be classified as PBT or vPvB
Assessment on Persistence. The substance can be considered as non-biodegradable for the water and terrestrial environment. The test results indicate that the substance is persistent (half-life in marine water >60 days, in soil >120 days). Therefore, the criteria for classification P are met.

Assessment on Bioaccumulation. The substance is considered cationic at environmental pH levels, the log Kow has been calculated on a –1 value. Following the Guide in Annex VIII, this value does not imply any bioaccumulation potential.

12.6. Other adverse effects

For the water environment, the sulphuric acid effects are clearly attributable to the pH effect, as an acid it dissociates completely into ions. Therefore, the same substance will not reach the sediment/terrestrial environment.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues	In compliance with local and national regulations deriving from Community provisions, dispose in landfill or incinerate. CER Code: 06 01 01, hazardous waste; a neutralising agent can be used for small amounts (see section 6). However, the exact code to be attributed must be assessed according to the production situations.
Waste from the product	Assess the possibility of substance reuse. Do not discharge in the sewer. Do not contaminate ponds, waterways or channels with the substance or containers used. All contaminated waste must be transformed in an industrial or urban wastewater treatment system that includes both primary and secondary treatments. The site must have an emission plan to ensure that adequate guarantees are implemented to minimise the impact of occasional releases.
Containers	Containers must be adequately cleaned before being reused or disposed of as waste according to regional or national regulations deriving from Community provisions. It is recommended not to remove the label until the container has been properly cleaned.

SECTION 14: TRANSPORT INFORMATION

Transport must be carried out with vehicles equipped and/or authorised to transport hazardous goods according to the regulations of the edition in force of the A.D.R. Agreement and the applicable national provisions. Transport must be carried out in the original packaging and, in any case, in packaging made of materials that are resistant to the contents and not subject to generating dangerous reactions with the contents. The operators in charge of loading and unloading hazardous goods must have received appropriate training on the risks posed by the preparation and on any procedures to be implemented in the event of an emergency situation.

14.1 UN number

ADR/ADN/RID: 2796
IMDG: 2796
IATA: 2796

14.2. UN proper shipping name

ADR/ADN/RID: ACID ELECTROLYTE FOR ACCUMULATORS
IMDG: BATTERY FLUID, ACID
IATA: BATTERY FLUID, ACID

14.3. Transport hazard class(es)

ADR/ADN/RID: 8
IMDG: 8
IATA: 8

14.4. Packing group
ADR/ADN/RID: II
IMDG: II
IATA: II

14.5. Environmental hazards

ADR/ADN/RID: NO
IMDG: NO
Marine Pollutant: NO
IATA: NO

14.6. Special precautions for user

ADR/ADN/RID

Classification code:	C1
Transport category:	2
Kemler No.:	80
Labels:	8
Special provisions:	-
Limited amount:	1 L
Exempt amount:	E2
Tunnel code:	E

IMDG

Labels:	8
Special provisions:	-
Limited amount:	1 L
Exempt amount:	E2
EmS:	F-A, S-B

IATA

Labels: 8 (Corrosive)

Exempt amount: E2

Packaging instructions:	Cargo:	855	Passengers:	851	Limited amount:	Y840
Maximum amount:		30 L		1 L		0.5 L
Special instructions:	-					

14.7. Transport in bulk according to Annex II of Marpol and the IBC Code
If you intend to transport in bulk, adhere to Annex II MARPOL 73/78 and the IBC code, where applicable.

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture	• Indications relating to the work activity limitation: Follow the Italian Legislative Decree 81/2008 regulations and subsequent amendments and additions • Ordinance on interventions in case of failure: Follow the Italian Legislative Decree 81/2008 regulations and subsequent amendments and additions • Water hazard class: Follow the Italian Legislative Decree 152/2006 regulations and subsequent amendments and additions • Regulation (EC) No.1907/2006 (REACH); • Annex XVII (CE) Regulation no.1907/2006 (REACH) - point 3 • Annex XIV (CE) Regulation no.1907/2006 (REACH) - No substance included. • Substances included in the Candidate List (art. 59. of the Reg. (CE) 1907/2006 - REACH): no substance included. • Seveso Directive - No substance involved.
15.2 Chemical safety assessment	Pursuant to Art. 14. of the Reg. (EC) 1907/2006, a chemical safety assessment of the substance has been carried out

SECTION 16: OTHER INFORMATION

The above information is provided in good faith on the basis of existing knowledge and is not a guarantee of safety under all conditions. It is the user's responsibility to comply with all applicable laws and regulations for storage, use, maintenance and disposal of the product. For any questions, contact the supplier. However, this is not a guarantee for any of the product features and does not establish any contractual legal relationship.

Acronyms and abbreviations
EWC - European Waste Catalogue
DNEL - Derived no-effect level
ECETOC - (European Centre for Ecotoxicology and Toxicology of Chemical)
ECHA – (European Chemicals Agency)
IUPAC - International Union of Pure and Applied Chemistry
LEV – (Local exhaust ventilation)
NOAEL – (No observed adverse effect *level)*
NOEC – (No Observed Effect Concentration)
EC Number – EINECS Number (European Inventory of Existing Commercial Chemical Substances)
CAS Number: Chemical Abstracts Service
OECD - OCSE (Organisation for Economic Co-operation and Development)
PBT – (Persistent Bioaccumulating and Toxic)
pc/g – body weight/day
PNEC - (Predicted No Effect Concentration)
REACH – (Registration, Evaluation and Authorisation of Chemicals)
SCOEL - (Scientific Committee on Occupational Exposure Limits)
STEL (Short term exposure limit)
SVHC – (Substances of Very High Concern)
TRA – (Targeted Risk Assessment)
TLV - (Threshold Limit Value)
TWA - (Time-Weighed Average)
vPvB – (very Persistent very Bioaccumulating)

GENERAL BIBLIOGRAPHY:

1. Regulation (EC) 1907/2006 of the European Parliament (REACH)
2. Regulation (EC) 1272/2008 of the European Parliament (CLP)
3. Regulation (EU) 790/2009 of the European Parliament (I Atp. CLP)
4. Regulation (EU) 2015/830 of the European Parliament
5. Regulation (EU) 286/2011 of the European Parliament (II Atp. CLP)
6. Regulation (EU) 618/2012 of the European Parliament (III Atp. CLP)
7. Regulation (EU) 487/2013 of the European Parliament (IV Atp. CLP)
8. Regulation (EU) 944/2013 of the European Parliament (V Atp. CLP)
9. Regulation (EU) 605/2014 of the European Parliament (VI Atp. CLP)
10. Regulation (EU) 2015/1221 of the European Parliament (VII Atp. CLP)
11. Regulation (EU) 2016/918 of the European Parliament (VII Atp. CLP)
12. Regulation (EU) 2016/1179 (IX Atp. CLP)
13. Regulation (EU) 2017/776 (X Atp. CLP)

- The Merck Index. - 10th Edition
- Handling Chemical Safety
- INRS - Fiche Toxicologique (toxicological sheet)
- Patty - Industrial Hygiene and Toxicology
- N.I. Sax - Dangerous properties of Industrial Materials-7, 1989 Edition
- IFA GESTIS Website
- ECHA Agency website
- Database of chemical substance SDS templates - Ministry of Health and Higher Health Institute

Specific concentration limits (in case of production of mixtures containing the substance)
≥15% Classification: Corrosive for the skin 1A,
≥5 <15% Classification: Irritating for the skin 2, Irritating for the eyes 2

ANNEXED EXPOSURE SCENARIOS (2)

Exposure scenario	Sector of Use	Process Categories	Product Categories	Environmental release category ERC
Use of sulphuric acid in the maintenance of batteries containing sulphuric acid	3	2,4,5,8a	0 - UCN Code E10100 (electrolytes)	1
Use of batteries containing sulphuric acid	21	PROC 19	0 - UCN Code E10100 (electrolytes)	9b

1 Exposure scenario (1 of 2) **Use of sulphuric acid in the maintenance of batteries containing sulphuric acid**	
Usage descriptors related to the life cycle phase	SU22 Professional uses: public sector (administration, education, entertainment, services, light industry) PC 0 UCN Code E10100 (Electrolytes) PROC 19 ERC8b; ERC9b
Description of the environmental scenario (1) and category of release in the corresponding environment (ERC)	1. Wide dispersive indoor use of reactive substances in open systems (ERC8b) 2. Wide dispersive outdoor use of substances in closed systems (ERC9b)
List of the names of the worker scenarios (2) and corresponding process categories (PROC)	1. Hand-mixing with intimate contact and only personal protective equipment (PPE) available (PROC19)
Section 2	**Operating conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical state of the product	Liquid, vapour pressure 214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Molecular weight	98.08
Substance concentration in the product	From 25% to 40%
Amounts used	The exposure is considered negligible, thanks to specialised systems.
Frequency and duration	8 hours/day for 220 days/year
Other information relating to duration, frequency and amount of use	Sporadic contacts may occur – Since the batteries are closed systems with long expected service times, maintenance is rather rare. Activities are rarely performed for 8 hours/day, however, the worst case was considered.
Respiratory volume under the conditions of use	10 m^3/day (standard value for 8 working hours per day)
Skin contact surface with the substance under conditions of use	480 cm^2 (standard value ECETOC). Please note that given the corrosive nature of the sulphuric acid, the dermal exposure is not deemed significant for the risk characterisation, as it must be prevented in any case.
Environment volume and ventilation speed	n/a (the loading and unloading of the sulphuric acid from the containers for battery maintenance normally takes place outdoors)
Scenarios	**Risk management measures**
Containment measures and good practice required Local extraction not required	n/a (the loading and unloading of the sulphuric acid from the containers for battery maintenance normally takes place outdoors)
Personal protective equipment (PPE)	Operators wear a helmet, gloves and anti-acid boots, PPE for the face and eyes and protective overalls. The batteries are generally serviced by trained plant technicians, according to procedures implemented for exposure containment and waste treatment.
Other risk management measures for workers	An emergency shower is required near the loading and unloading stations, to be used in case of accidental releases.
Section 2.2	**Environmental exposure control**
Molecular weight	98.08
Product characteristics	Vapour pressure 0.1 hPa at 20°C
Water solubility	Miscible
N-octanol/water partition coefficient	-1 (logKow)

Koc	1
Bio-degradation	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	n/a
Frequency and duration	365 days per year
Discharge volume of the wastewater treatment plant	2000 m^3/day (standard values EUSES for local STP)
Flow available of the receiving water body to which the site's wastewater is sent	20,000 m^3/day (Standard ERC value of flow rate that allows for a dilution of 10 times in the receiving water body)
Amount of substance in wastewater deriving from uses identified in this scenario	342 kg/day (value based on the worst case identified for emission in water)
Amount of substance in waste deriving from the articles	n/a
Type of waste (suitable codes)	Adequate EWC codes
Type of external treatment for the recycle or recovery of the substance	None – The sulphuric acid in water treatment plants dissociates into its constituent, non-hazardous, ions.
Type of external treatment for the final disposal of waste	Incineration or landfill.
Fraction of the substance released in the air during waste handling	n/a
Fraction of the substance released in wastewater during waste handling	n/a
Fraction of substance disposed of as secondary waste	n/a

Section 3 Exposure Estimate
3.1. Health

First level assessment (Tier 1): the exposure assessment by inhalation was carried out using the ECETOC TRA model
Input parameters for the model

	Parameter
Molecular weight	98.08 g/mol
Vapour pressure	214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Physical state of the product	Liquid
Dustiness	n/a
Activity duration	>4 hours
Ventilation	Indoor environments with local aspiration (LEV)

The estimate of the exposure with ECETOC was refined through a second level assessment by inhalation (Tier 2) carried out using the ART model, obtaining more realistic results.
Input parameters for the ART model

	PROC	Parameter
Exposure duration	19	240 minutes of exposure – 240 minutes of non-exposure
Type of product	19	Liquid (low viscosity – like water)
Process temperature	19	Environmental temperature (15-25°C)

Vapour pressure	19	The substance is considered little volatile, exposure to mists is considered
Liquid fraction weight	19	0.25
Localisation of the primary emission source	19	The primary emission source is localised in the worker's breathing area (within 1 metre)
Activity class	19	Handling of contaminated objects
Containment	19	n.a.
Localised control systems	19	None
Segregation	19	n.a.
Fugitive emission sources	19	Not completely closed – good effective practices implemented
Dispersion	19	Inside, any environment dimension, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below their DNEL

3.2. Environment

First level assessment (Tier 1): it was carried out using the EUSES model and by entering the standard input data and ERC. It was not necessary to carry out the second level assessment.
Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	98.08	g/mol	
Vapour pressure at 20°C	0.1	hPa	
Water solubility	Miscible	Mg/ml	
Partition coefficient: n-octanol/water	-1	LogKow	
Koc	1		
Bio-degradation	Non-biodegradable		
Life cycle phase	Widely distributed use in the territory		
Environmental release class	ERC8b, ERC9b		
Fraction of regional tonnage (Tier 1)			1
STP			Yes
Emission events per year	365 (considering that maintenance is carried out for most days in some site within the concerned region)	days	365
Release in air (standard value)	ERC8b: 0.1 ERC9b: 5	%	ERC8b: 0.1 ERC9b: 5
Release in water (standard value)	ERC8b: 2 ERC9b: 5	%	ERC8b: 2 ERC9b: 5
Dilution factor applied for the derivation of PEC			25*10^9 m^3/year (large-scale distribution)
Tonnage	2,500	t/year	Estimated use in single sites

Risk containment measures and values measured used in the second level assessment (Tier 2)
(Not applicable: 2nd level assessment not required)

The concentration estimated for all environmental compartments is below the respective PNEC

Section 4
Guide for assessing if working within the limits established by the scenario
4.1. Health

It is provided that exposures do not exceed acute and chronic inhalers DNEL for local effects when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.
Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.

4.2. Environment
It is provided that exposures do not exceed the PNEC when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.
Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.

2 Exposure scenario (2 of 2) **Use of batteries containing sulphuric acid**	
Usage descriptors related to the life cycle phase	SU21 Consumer uses: households (= population in general = consumers) AC3 Electric batteries and accumulators No process – PROC 19 is adopted as worst case ERC9b
Description of the environmental scenario (1) and category of release in the corresponding environment (ERC)	Wide dispersive outdoor use of substances in closed systems (ERC9b)
List of the names of the worker scenarios (2) and corresponding process categories (PROC)	Hand-mixing with intimate contact and only personal protective equipment (PPE) available (PROC19)
Section 2	**Operating conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical state of the product	Liquid, vapour pressure 214 Pa (for the diluted electrolyte solution)
Molecular weight	98.08
Substance concentration in the product	From 25% to 40%
Amounts used	n/a – activity carried out very sporadically by the consumer
Frequency and duration	8 hours/day for 220 days/year
Other operating conditions that affect worker exposure	Sporadic contacts may occur – The batteries are closed systems with long expected service times, therefore, maintenance is rather rare
Respiratory volume under the conditions of use	10 m^3/day (standard value for 8 working hours per day)
Skin contact surface with the substance under conditions of use	480 cm^2 (standard value ECETOC). Please note that given the corrosive nature of the sulphuric acid, the dermal exposure is not deemed significant for the risk characterisation, as it must be prevented in any case.
Environment volume and ventilation speed	n/a (activities are generally carried out outdoors)
Scenarios	**Risk management measures**
Containment measures and good practice required Local extraction not required	Activity is generally carried out outdoors. Consumers are advised to wear protective clothing. However, the worst assumption is that localised checks are not adopted.
Personal protective equipment (PPE)	Activity is generally carried out outdoors. Consumers are advised to wear protective clothing. However, the worst assumption is that localised checks are not adopted.
Other risk management measures for workers	No other measure is required.
Section 2.2	**Environmental exposure control**
Molecular weight	98.08
Product characteristics	Vapour pressure 0.1 hPa at 20°C
Water solubility	Miscible
Partition coefficient: n-octanol/water	-1 (logKow)
Koc	1
Bio-degradation	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	n/a
Frequency and duration	365 days per year

Discharge volume of the wastewater treatment plant	2000 m^3/day (standard values EUSES for local STP)
Flow available of the receiving water body to which the site's wastewater is sent	20,000 m^3/day (Standard ERC value of flow rate that allows for a dilution of 10 times in the receiving water body)
Amount of substance in wastewater deriving from uses identified in this scenario	34.2 kg/day value based on the worst case identified
Amount of substance in waste deriving from the articles	n/a
Type of waste (suitable codes)	Adequate codes taken from the European list of waste
Type of external treatment for the recycle or recovery of the substance	None
Type of external treatment for the final disposal of waste	Dissociation in constituent ions (non-hazardous) in a wastewater treatment plant.
Fraction of the substance released in the air during waste handling	n/a
Fraction of the substance released in wastewater during waste handling	n/a
Fraction of substance disposed of as secondary waste	n/a

Section 3 Exposure Estimate

3.1. Health

First level assessment (Tier 1): the exposure assessment by inhalation was carried out using the ECETOC TRA model

Input parameters for the model

	Parameter
Molecular weight	98.08 g/mol
Vapour pressure	214 Pa (for the diluted electrolyte solution, considering the solution with lower concentration)
Physical state of the product	Liquid
Dustiness	n/a
Activity duration	From 15 minutes to 1 hour
Ventilation	Indoor environments without local aspiration (LEV)

The estimate of the exposure with ECETOC was refined through a second level assessment by inhalation (Tier 2) carried out using the ART model, obtaining more realistic results.

Input parameters for the ART model

	PROC	Parameter
Exposure duration	19	240 minutes of exposure – 240 minutes of non-exposure
Type of product	19	Liquid (low viscosity – like water)
Process temperature	19	Environmental temperature (15-25°C)
Vapour pressure	19	6 Pa - The substance is considered little volatile, exposure to mists is considered
Liquid fraction weight	19	0.25
Localisation of the primary emission source	19	The primary emission source is localised in the worker's breathing area (within 1 metre)
Activity class	19	Handling of contaminated objects
Localised control systems	All	None

Fugitive emission sources	All	Not completely closed – good effective practices implemented
Dispersion	All	Inside, any environment dimension, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below their DNEL

3.2. Environment
First level assessment (Tier 1): it was carried out using the EUSES model and by entering the standard input data and ERC.
Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	98.08	g/mol	
Vapour pressure at 20°C	0.1	hPa	
Water solubility	Miscible	Mg/ml	
Partition coefficient: n-octanol/water	-1	LogKow	
Koc	1		
Bio-degradation	Non-biodegradable		
Life cycle phase	Widely distributed use		
Environmental release class	ERC9b		
Fraction of regional tonnage (Tier 1)			1
STP			Yes
Emission events per year	365 (it is considered probable that the activity is carried out in some site in the region on most days, due to the small but highly distributed scale of this use)	days	365
Release in air (standard value)	5	%	5
Release in water (standard value)	5	%	5
Dilution factor applied for the derivation of PEC			25 * 10(9) m^3/year
Tonnage	2,500	t/year	Estimated use in single sites

Second level assessment not carried out (Tier 2)

The concentration estimated for all environmental compartments is below the respective PNEC

Section 4 Guide for assessing if working within the limits established by the scenario

4.1. Health
It is provided that exposures do not exceed acute and chronic inhalers DNEL for local effects when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.
Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.

4.2. Environment
It is provided that exposures do not exceed the PNEC when the Operating Conditions/Risk Management Measures illustrated in Section 3 are applied.
Where different Operating Conditions/Risk Management Measures are adopted, the users must ensure that the risks are managed at least at an equivalent level.