Safety Data Sheet

(according to the last version of the Reg. (EC) 1907/2006 – art. 31)

OLEUM, FUMING SULFURIC ACID

Safety Data Sheet dated 11/3/2024, version 1

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

1.1. Product identifier

Mixture identification: Fuming Sulfuric Acid

Trade name: OLEUM, FUMING SULFURIC ACID

UFI: QP00-0077-700H-Y5DC

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

Recommended use:

Substance production

Oleum formulation

Use as an intermediate

Use as a nitration agent

1.3. Details of the supplier of the safety data sheet

Company:

Marchi Industriale Spa – Viale Belfiore, 20 – 50144 Firenze (FI)

Tel +39 055475547, fax +39 055496626

Competent person responsible for the safety data sheet:

E-mail: laboratorio@marchi-industriale.it

1.4. Emergency telephone number

EUROPEAN EMERGENCY NUMBER h 24/24: 112

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

EC regulation criteria 1272/2008 (CLP)

 Danger, Skin Corr. 1A, Causes severe skin burns and eye damage.

 Danger, Eye Dam. 1, Causes serious eye damage.

 Warning, STOT SE 3, May cause respiratory irritation.

EUH014 Reacts violently with water.

Adverse physicochemical, human health and environmental effects: No other hazards

2.2. Label elements

Hazard pictograms:

Danger

Hazard statements:

H314 Causes severe skin burns and eye damage.

H335 May cause respiratory irritation.

Precautionary statements:

P260 Do not breathe fume.

P280 Wear protective gloves/clothing and eye/face protection.

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

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

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

P312 Call a doctor if you feel unwell.

Special Provisions:

EUH014 Reacts violently with water.

Contains

sulfur trioxide

sulphuric acid

Special provisions according to Annex XVII of REACH and subsequent amendments: None

2.3. Other hazards

No PBT, vPvB or endocrine disruptor substances present in concentration ≥ 0.1%

Other Hazards: No other hazards

SECTION 3: Composition/information on ingredients

3.1. Substances: N.A.

3.2. Mixtures

Hazardous components within the meaning of the CLP regulation and related classification:

Qty	Name	Ident. Number	Classification
> 70% - < 80%	sulphuric acid	Index number: 016-020-00-8 CAS: 7664-93-9 EC: 231-639-5 REACH No.: 01-2119458838-20-0088	 3.2/1A Skin Corr. 1A H314 Specific Concentration Limits: C ≥ 15%: Skin Corr. 1A H314 5% ≤ C < 15%: Skin Irrit. 2 H315 5% ≤ C < 15%: Eye Irrit. 2 H319
> 20% - < 30%	sulfur trioxide	Index number: 231-197-3 CAS: 7446-11-9 EC: 231-197-3 REACH No.: 01-2119458835-26-0027	 3.2/1A Skin Corr. 1A H314  3.8/3 STOT SE 3 H335 EUH014

All the constituents of the mixture are in compliance with EC Regulation 1907/2006 and have been registered by the manufacturers / importers / only representatives when mandatory: the registration numbers will be available to the Authority within seven days of their request.

Other substances may be present exempt from registration as required by article 2 or because they are produced / imported in quantities less than one ton per year.

SECTION 4: First aid measures

4.1. Description of first aid measures

In case of skin contact:

Immediately take off all contaminated clothing.

OBTAIN IMMEDIATE MEDICAL ATTENTION.

Remove contaminated clothing immediatley and dispose off safely.

After contact with skin, wash immediately with soap and plenty of water.

In case of eyes contact:

After contact with the eyes, rinse with water with the eyelids open for a sufficient length of time, then consult an opthalmologist immediately.

Protect uninjured eye.

In case of Ingestion: Do NOT induce vomiting.

In case of Inhalation:

In case of inhalation, consult a doctor immediately and show the packing or label.

4.2. Most important symptoms and effects, both acute and delayed: None

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

In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Treatment: None

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: CO2 or Dry chemical fire extinguisher.

Extinguishing media which must not be used for safety reasons: Water.

5.2. Special hazards arising from the substance or mixture

Do not inhale explosion and combustion gases.

Burning produces heavy smoke.

5.3. Advice for firefighters

Use suitable breathing apparatus .

Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

Move undamaged containers from immediate hazard area if it can be done safely.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non emergency personnel:

Wear personal protection equipment.

Wear breathing apparatus if exposed to vapours/dusts/aerosols.

Provide adequate ventilation.

Use appropriate respiratory protection.

See protective measures under point 7 and 8.

For emergency responders: Wear personal protection equipment.

6.2. Environmental precautions

Do not allow to enter into soil/subsoil. Do not allow to enter into surface water or drains.

Retain contaminated washing water and dispose it.

In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

Suitable material for taking up: absorbing material, organic, sand

6.3. Methods and material for containment and cleaning up

Keep away from water or from damp surroundings.

6.4. Reference to other sections: See also section 8 and 13

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Avoid contact with skin and eyes, inhalation of vapours and mists.

Use localized ventilation system.

Don't use empty container before they have been cleaned.

Before making transfer operations, assure that there aren't any incompatible material residuals in the containers.

See also section 8 for recommended protective equipment.

Advice on general occupational hygiene:

Contamined clothing should be changed before entering eating areas.

Do not eat or drink while working.

7.2. Conditions for safe storage, including any incompatibilities

Keep away from food, drink and feed.

Conservare nel contenitore originale. Conservare il contenitore ermeticamente chiuso in un luogo fresco, asciutto e ben ventilato. Tenere il prodotto lontano da fonti di calore (<35°C), luce solare diretta, lontano da materiali incompatibili (alcali)

Materiali di imballaggio idonei: contenitori di plastica. Se si utilizzano contenitori metallici, assicurarsi che siano protetti all'interno dalla corrosione.

Incompatible materials: Alkalis and oxidants

Instructions as regards storage premises: Adequately ventilated premises.

7.3. Specific end use(s): None in particular

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

sulphuric acid - CAS: 7664-93-9

- OEL Type: EU - TWA(8h): 0.05 mg/m³ - Notes: thoracic fraction
- OEL Type: ACGIH - TWA(8h): 0.2 mg/m³ - Notes: (T), A2(M) - Pulm func

DNEL Exposure Limit Values

sulphuric acid - CAS: 7664-93-9

Worker Industry: 50 µg/m³ - Exposure: Inhalation - Frequency: Long Term, local effects
Worker Industry: 100 µg/m³ - Exposure: Inhalation - Frequency: Short Term, local effects

sulfur trioxide- CAS: 7446-11-9

Worker Industry: 50 µg/m³ - Frequency: Long Term, local effects - Endpoint: irritation of the respiratory tract
Worker Industry: 100 µg/m³ - Frequency: Short Term, local effects - Endpoint: irritation of the respiratory tract

PNEC Exposure Limit Values

sulphuric acid - CAS: 7664-93-9

Target: Fresh Water - Value: 2.5 µg/L
Target: STP - Value: 8.8 mg/l
Target: Freshwater sediments - Value: 2 µg/kg dw
Target: Marine water - Value: 250 ng/L
Target: Marine water sediments - Value: 2 µg/kg dw

8.2. Exposure controls

Eye protection: Use close fitting safety goggles, don't use eye lens.

Protection for skin:

Use clothing that provides comprehensive protection to the skin, e.g. cotton, rubber, PVC or viton.

Protection for hands:

Use protective gloves that provides comprehensive protection, e.g. P.V.C., neoprene or rubber.

Respiratory protection:

Use respiratory protection where ventilation is insufficient or exposure is prolonged.

Thermal Hazards: None

Environmental exposure controls: None

Appropriate engineering controls: None

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Properties	Value	Method:	Notes
Physical state:	Liquid	--	--
Colour:	Colourless	--	--
Odour:	Typical	--	--
Melting point/freezing point:	16.8°C	--	--
Boiling point or initial boiling point and boiling range:	44.8°C a 1013 hPa	--	--
Flammability:	Non-flammable	--	--
Lower and upper explosion limit:	N.A.	--	--
Flash point:	N.A.	--	--
Auto-ignition temperature:	Not Relevant	--	--
Decomposition temperature:	Not Relevant	--	--
pH:	0,3	--	--
Kinematic viscosity:	N.A.	--	--
Solubility in water:	Hydrolyzes immediately to	--	--

	form sulfuric acid		
Solubility in oil:	Not Relevant	--	--
Partition coefficient n-octanol/water (log value):	Not Relevant	--	--
Vapour pressure:	97.3 hPa (24.85°C)	--	--
Density and/or relative density:	~1922 kg/m³ (20°C) (conc. 100%)	--	--
Relative vapour density:	N.A.	--	--
Particle characteristics:			
Particle size:	N.A.	--	--

9.2. Other information: No other relevant information

SECTION 10: Stability and reactivity

10.1. Reactivity: Stable under normal conditions
10.2. Chemical stability: Reacts with strong oxidizing agents and alkaline substances (bases).
10.3. Possibility of hazardous reactions
The product reacts violently with water and alkalis. Produces fumes in contact with atmospheric humidity alone.
10.4. Conditions to avoid: Stable under normal conditions.
10.5. Incompatible materials: Metals, fuels, alkalis, chlorates, hydrochloric acid.
10.6. Hazardous decomposition products: Sulfur / hydrogen oxides

SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008
Toxicological information of the product:
OLEUM, FUMING SULFURIC ACID
a) acute toxicity
Not classified
Based on available data, the classification criteria are not met
b) skin corrosion/irritation
The product is classified: Skin Corr. 1A H314
c) serious eye damage/irritation
The product is classified: Eye Dam. 1 H318
d) respiratory or skin sensitisation
Not classified
Based on available data, the classification criteria are not met
e) germ cell mutagenicity
Not classified
Based on available data, the classification criteria are not met
f) carcinogenicity
Not classified
Based on available data, the classification criteria are not met
g) reproductive toxicity
Not classified
Based on available data, the classification criteria are not met
h) STOT-single exposure
The product is classified: STOT SE 3 H335
i) STOT-repeated exposure
Not classified
Based on available data, the classification criteria are not met
j) aspiration hazard

Not classified
Based on available data, the classification criteria are not met
Toxicological information of the main substances found in the product:
sulphuric acid - CAS: 7664-93-9
a) acute toxicity:
Test: LC50 - Route: Inhalation - Species: Rat = 0.375 mg/l - Duration: 4h
b) skin corrosion/irritation:
Skin Corrosive
c) serious eye damage/irritation:
Eye Irritant
j) aspiration hazard:
Respiratory Tract Irritant
sulfur trioxide - CAS: 7446-11-9
c) serious eye damage/irritation:
Eye Irritant
11.2. Information on other hazards
Endocrine disrupting properties:
No endocrine disruptor substances present in concentration ≥ 0.1%

SECTION 12: Ecological information

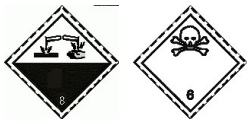
12.1. Toxicity
Adopt good working practices, so that the product is not released into the environment.
OLEUM, FUMING SULFURIC ACID
Not classified for environmental hazards
Based on available data, the classification criteria are not met
sulphuric acid - CAS: 7664-93-9
a) Aquatic acute toxicity:
Endpoint: LC50 - Species: Fish = 16 mg/l - Duration h: 96
Endpoint: EC50 - Species: Invertebrates > 100 mg/l - Duration h: 48
b) Aquatic chronic toxicity:
Endpoint: NOEC - Species: Fish = 25 µg/L
Endpoint: NOEC - Species: Invertebrates = 150 µg/L
c) Bacteria toxicity:
Endpoint: NOEC - Species: Microorganisms = 26 g/l
g) Toxicity to aquatic algae and cyanobacteria:
Endpoint: NOEC - Species: Algae = 100 mg/l - Duration h: 72
sulfur trioxide- CAS: 7446-11-9
c) Bacteria toxicity:
Endpoint: NOEC - Species: Microorganisms = 26 g/l
g) Toxicity to aquatic algae and cyanobacteria:
Endpoint: EC50 - Species: Freshwater algae = 100 mg/l - Duration h: 72
Endpoint: NOEC - Species: Freshwater algae = 100 mg/l - Duration h: 72
12.2. Persistence and degradability: N.A.
12.3. Bioaccumulative potential: N.A.
12.4. Mobility in soil: N.A.
12.5. Results of PBT and vPvB assessment
vPvB Substances: None - PBT Substances: None
12.6. Endocrine disrupting properties
No endocrine disruptor substances present in concentration ≥ 0.1%
12.7. Other adverse effects: None

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Recover, if possible. Send to authorised disposal plants or for incineration under controlled conditions. In so doing, comply with the local and national regulations currently in force.

SECTION 14: Transport information



14.1. UN number or ID number

ADR-UN Number:	1831
IATA-UN Number:	1831
IMDG-UN Number:	1831

14.2. UN proper shipping name

ADR-Shipping Name:	SULPHURIC ACID, FUMING
RID-Shipping Name:	N.A.
ADN-Shipping Name:	N.A.
IATA-Shipping Name:	SULPHURIC ACID, FUMING
IMDG-Shipping Name:	SULPHURIC ACID, FUMING

14.3. Transport hazard class(es)

ADR-Class:	8
ADR - Hazard identification number:	X886
IATA-Class:	8
IATA-Label:	-
IMDG-Class:	8

14.4. Packing group

ADR-Packing Group:	I
IATA-Packing group:	I
IMDG-Packing group:	I

14.5. Environmental hazards

ADR-Enviromental Pollutant:	No
IMDG-Marine pollutant:	No
IMDG-EmS:	F-A , S-B

14.6. Special precautions for user

ADR-Subsidiary hazards:	6.1
ADR-S.P.:	-

ADR-Transport category (Tunnel restriction code): 1 (C/D)

IATA-Passenger Aircraft:	Forbidden
IATA-Subsidiary hazards:	6.1
IATA-Cargo Aircraft:	Forbidden
IATA-S.P.:	A2
IATA-ERG:	8P
IMDG-Subsidiary hazards:	6.1
IMDG-Stowage and handling:	Category C SW2 SW15
IMDG-Segregation:	SGG1a SG36 SG49

14.7. Maritime transport in bulk according to IMO instruments: N.A.

SECTION 15: Regulatory information

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

Dir. 98/24/EC (Risks related to chemical agents at work)
Dir. 2000/39/EC (Occupational exposure limit values)
Regulation (EC) n. 1907/2006 (REACH) consolidated

Regulation (EC) n. 1272/2008 (CLP) consolidated

Restrictions related to the product or the substances contained according to Annex XVII Regulation (EC) 1907/2006 (REACH) and subsequent modifications:

Restrictions related to the product:

Restriction 3

Restrictions related to the substances contained:

Restriction 75

Reportable explosives precursors according to EU Reg. 2019/1148

Restricted explosives precursors according to EU Reg. 2019/1148

Sanitary checks.

Workers exposed to this hazardous chemical agent must be subjected to health surveillance carried out in accordance with the provisions of art. 41 of Legislative Decree 81 of 9 April 2008 unless the risk to the safety and health of the worker has been assessed as irrelevant, in accordance with the provisions of art. 224 paragraph 2.

Where applicable, refer to the following regulatory provisions :

Regulation (EU) 2019/1148 (explosives precursors)

Directive 2012/18/EU (Seveso III)

Regulation (EC) nr 648/2004 (detergents).

Dir. 2004/42/EC (VOC directive)

Provisions related to directive EU 2012/18 (Seveso III):

Seveso III category according to Annex 1, part 1: None

15.2. Chemical safety assessment

No Chemical Safety Assessment has been carried out for the mixture while those of the registered substances contained therein are available.

SECTION 16: Other information

Full text of phrases referred to in Section 3:

H314 Causes severe skin burns and eye damage.

H315 Causes skin irritation.

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

EUH014 Reacts violently with water.

Hazard class and hazard category	Code	Description
Skin Corr. 1A	3.2/1A	Skin corrosion, Category 1A
Skin Irrit. 2	3.2/2	Skin irritation, Category 2
Eye Dam. 1	3.3/1	Serious eye damage, Category 1
Eye Irrit. 2	3.3/2	Eye irritation, Category 2
STOT SE 3	3.8/3	Specific target organ toxicity - single exposure, Category 3

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]:

Classification according to Reg. (EC) Nr. 1272/2008	Classification procedure
Skin Corr. 1A, H314	Calculation method
Eye Dam. 1, H318	Calculation method
STOT SE 3, H335	Calculation method

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OLEUM, FUMING SULFURIC ACID

This document was prepared by a competent person who has received appropriate training.
Main bibliographic sources:

ECDIN - Environmental Chemicals Data and Information Network - Joint Research Centre, Commission of the European Communities

SAX's DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS - Eight Edition - Van Nostrand Reinold

The information contained herein is based on our state of knowledge at the above-specified date. It refers solely to the product indicated and constitutes no guarantee of particular quality.
It is the duty of the user to ensure that this information is appropriate and complete with respect to the specific use intended.
This MSDS cancels and replaces any preceding release.

ADR:	European Agreement concerning the International Carriage of Dangerous Goods by Road.
ATE:	Acute Toxicity Estimate
ATEmix:	Acute toxicity Estimate (Mixtures)
CAS:	Chemical Abstracts Service (division of the American Chemical Society).
CLP:	Classification, Labeling, Packaging.
DNEL:	Derived No Effect Level.
EINECS:	European Inventory of Existing Commercial Chemical Substances.
GefStoffVO:	Ordinance on Hazardous Substances, Germany.
GHS:	Globally Harmonized System of Classification and Labeling of Chemicals.
IATA:	International Air Transport Association.
IATA-DGR:	Dangerous Goods Regulation by the "International Air Transport Association" (IATA).
ICAO:	International Civil Aviation Organization.
ICAO-TI:	Technical Instructions by the "International Civil Aviation Organization" (ICAO).
IMDG:	International Maritime Code for Dangerous Goods.
INCI:	International Nomenclature of Cosmetic Ingredients.
KSt:	Explosion coefficient.
LC50:	Lethal concentration, for 50 percent of test population.
LD50:	Lethal dose, for 50 percent of test population.
PNEC:	Predicted No Effect Concentration.
RID:	Regulation Concerning the International Transport of Dangerous Goods by Rail.
STEL:	Short Term Exposure limit.
STOT:	Specific Target Organ Toxicity.
TLV:	Threshold Limiting Value.
TWA:	Time-weighted average
WGK:	German Water Hazard Class.

Safety Data Sheet

(according to the last version of the Reg. (EC) 1907/2006 – art. 31)

OLEUM, FUMING SULFURIC ACID

EXPOSURE SCENARIOS (4) ANNEXES

1 Exposure scenario (1 of 4) **Production of Oleum, Fuming Sulfuric Acid**	
Life Cycle Phase Related Use Descriptors	PROC1/8b/9/15 ERC1
Description of the environmental scenario (1) and corresponding environmental release category (ERC)	1. Substance production (ERC1)
List of worker scenario names (2) and corresponding process categories (PROC)	1. Use in a closed process, exposure unlikely (PROC1) 2. Transfer of a substance or mixture (filling/emptying) from/to vessels/large containers in dedicated facilities (PROC8b) 3. Transfer of a substance or mixture into small containers (dedicated filling line, including weighing) (PROC9) 4. Use as laboratory reagents (PROC15)
Exposure Criteria of the SE	SCOEL: - 0.05 mg/m³ - 8 hours TWA - 0.1 mg/m³ - 15 min. TWA
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product features	
Type of product to which the information relates	Substance as such: the product is in liquid form in a sealed container in both cases.
Product form	Liquid
Molecular weight	80,06
Concentration of the substance in the product	>98%
Quantities used	Exposure is considered negligible, taking into account that the production takes place in closed, specialised systems
Frequency and duration	8 hours/day for 220 days/year
Other inherent information duration, frequency and amount of use	Sporadic contacts may occur
Respiratory volume below conditions of use	10 m^3/day (standard value for 8 working hours per day)
Surface of skin contact with the substance under conditions of use	480 cm^2 (ECETOC standard value). It should be noted that due to the corrosive nature of oleum, dermal exposure is not considered relevant for risk characterisation, as it must be prevented in any case.
Volume of the environment and speed of ventilation	n.a. (not relevant, as workers work in controlled environments, without direct contact with equipment using the substance)
Scenarios	**Risk management measures**
Containment measures and good necessary practices Local suction if required	Specific equipment with high containment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outside. Loading and unloading of the oleum-containing containers takes place outside.

Personal protective equipment (IPR)	Specific high-containment equipment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outdoors Workers involved in the sampling and transfer of tanker materialsare trained in the procedures and means of protection (hard hat, acid-proof glovesand boots, face and eye protection PPE and protective overalls) to minimise exposure and risks.

Other risk management measures for workers	An emergency shower is required in the vicinity of the loading stations anddischarge, to be used in case of accidental releases.
Section 2.2	**Environmental exposure control**
Molecular weight	80.06 g/mol
Product features	Liquid
Vapour pressure	9730 Pa
Solubility in water	10000 mg/L Representative value used in models as oleum hydrolyses rapidly in water to form sulphuric acid which is highly soluble.
Partition coefficient n-octanol/water	-1 (logKow)
Koc	1
Biodegradability	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	60,000 t/a
Frequency and duration	365 days/year
Waste water treatment plant discharge volume	2000 m3/day (EUSES standard value for local STPs)
Available flow rate of the receiving water body to which the site's wastewater is sent	20,000 m3/day (Standard ERC flow value allowing 10-fold dilution in the receiving water body)
On-site waste water pre-treatment.	
Quantity of substance present in discharges from the site to the external sewage system	The neutralisation process is extremely efficient. pH monitoring allows the complete neutralisation and removal of the substance to be verified. Complete transformation of sulphur trioxide into sulphuric acid.
Reduction of air emissions	Effectiveness: appropriate measures are put in place. Exhaust gases are treated using scrubbers. And in any case, emissions can be monitored and controlled in accordance with the applicable regulations.
Quantity of substance released into the atmosphere	33 kg/day (worst-case measured value)
Effluent discharge rates (of waste water treatment plants)	2000 m^3/day (standard value)
Sludge recovery for use in agriculture	No All sludge is collected and sent to incineration or landfill
Quantity of the substance in waste water from the uses identified in this scenario	0 kg/day (value based on specialised procedures ofwastewater treatment)
Amount of substance in waste from articles	n.a.
Type of waste (appropriate codes)	Appropriate codes from European Waste List
Type of external treatment for recycling or recovery of the substance	None
Type of external treatment for final waste disposal	Incineration or landfill
Fraction of the substance released into the air during waste handling	n.a.
Fraction of the substance released in waste water during waste handling	n.a.

Fraction of substance disposed of as secondary waste	n.a.

Section 3	Exposure Estimation

3.1. Health

Tier 1 assessment: the inhalation exposure assessment was performed using the ECETOC TRA model
parameters for the model

Parameter	Input
Molecular weight	80.06 g/mol
Vapour pressure	9730 Pa
Product form	Liquid
Dustiness	n.a.
Duration of activity	>4 hours
Ventilation	Indoor environments with LEV
Use of respiratory protection	Yes, 95 per cent efficiency

Tier 2 assessment: the inhalation exposure assessment was performed using the ART model
parameters for the ART model

PROC	Parameter	Input
Duration of exposure	All	480 minutes
Type of product	All	Liquid
Process temperature	1	High temperatures (50-150°C)
	8b, 9	Ambient temperature (15-25°C)
Vapour pressure	All	9730 pa
Liquid fraction weight	All	Pure liquid (100%)
Localisation of the primary emission source	All	The primary emission source is not located in the breathing zone of the workers (workers located in the control)
Activity class	All	Transfer of liquid products
Containment	1, 9	Handling with reduced contact between product and surrounding air, controlled load
	8b	n.a. for bottom loading or containers
Localised control systems	1, 8b, 9	Vapour recovery system; suction local forced (LEV)
Segregation	1, 9	Complete separation of workers, control room operators
	8b	Partial separation of workers
Sources of fugitive emissions	1, 8b, 9	Fully closed process - not open for sampling activities
Dispersion	1	Outdoors, not near buildings, workers must be at a distance >4 metres from the source
	8b	Outdoors near buildings, workers must be at a distance >4 metres from the source
	9	Inside, any size environment, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below the respective DNELs

3.2. Environment

Tier 1 evaluation: was carried out using the EUSES model and input datastandards and ERCs.
The Tier 1 assessment estimated an exposure that was considered unrealistic.
Tier 2 assessment: was carried out using the EUSES model and including input data more relevant to the description of sulphur trioxide production and uses.
Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (ifapplicable)
Molecular weight	80,06	g/mol	
Vapour pressure at 25°	9730	hPa	
Solubility in water	Miscible	Mg/ml	
Partition coefficient n-octanol/water	-1	LogKow	
Koc	1		
Biodegradability	Non-biodegradable		
Life cycle phase	Production		
Environmental release class	ERC1		
Regional tonnage fraction (Tier 1)			1
STP			Yes
Issuing events per year	360	days	300
Release to air (standard value)	5	%	5
Release to water (standard value)	6	%	6
Dilution factor applied for PEC derivation			10 (20,000 m3/day)
Tonnage	Approximately 60,000	tonnes/year	

Risk mitigation measures and measured values used in Tier 2 assessment.

Description of measures on EUSES	Details	Effects considered in entries	Notes
No release in the sewage	0 mg/l	Reduction of the STP effluent concentration to 0 mg/l in view of the transformation of oleum into sulphuric acid and the neutralisation process	Total neutralisation at pH 7 approx.
Days of issue year	360 issuing days per 20 per cent	Increase in emission days by	Continuous production
Sludge removal sent to incineration or landfill	Sludge removed and sludge set to 0.	Concentration in soil from agricultural land and	No contamination of grassland

Planned releases to the environment (Tier 2)

ERC	Compartments	Planned releases	Explanation/source of data
1	Freshwater (after STP)	0 kg/day	Based on effective neutralisation
	Release into the air	8.260 kg/day	
	Soil (only directly) Agricultural soil	0 kg/day	No leakage directly to the ground is expected for this ERC and no sludge spreading

Estimated concentrations for all environmental compartments are below their respective PNECs

Section 4	**Guidance for assessing whether you are operating within the limits set by the scenario**

4.1. Health

Exposures are not expected to exceed acute and chronic inhalation DNELs for local effects when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.1.1 Health - Uses not recommended

n.a.

4.2. Environment

Exposures are not expected to exceed the PNECs when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied Where several Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level
4.2.1 Environment – Uses not recommended
n.a.

1 Exposure scenario (2 of 4) **Formulation or repackaging - Formulation of oleum**	
Life Cycle Phase Related Use Descriptors	PROC 1/8b/9/15 ERC2
Description of the environmental scenario (1) and corresponding environmental release category (ERC)	1. Formulation of preparations (ERC2)
List of worker scenario names (2) and corresponding process categories (PROC)	1. Use in a closed process, exposure unlikely (PROC1) 2. Transfer of a substance or preparation (filling/emptying) from/to vessels/large containers in dedicated facilities (PROC8b) 3. Transfer of a substance or preparation into small containers (dedicated filling line, including weighing) (PROC9) 4. Use as laboratory reagents (PROC15)
Exposure Criteria of the SE	SCOEL: - 0.05 mg/m³ - 8 hours TWA - 0.1 mg/m³ - 15 min. TWA
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product features	
Type of product to which the information relates	Substance in oleum: the product is in liquid form in a sealed container
Product form	Liquid
Molecular weight	80,06
Concentration of the substance in the product	SO3 produced > 98% in oleum 20 -25%; SO3 is dissolved in sulphuric acid to form oleum
Quantities used	The exposure of operators considered negligible, due to the use of specific systems.
Frequency and duration	8 hours/day for 220 days/year
Other information on duration, frequency and amount of use	Sporadic contacts may occur - The task rarely takes up the whole 8-hour working day
Respiratory volume below conditions of use	10 m3/day (standard value for 8 working hours per day)
Surface of skin contact with the substance under conditions of use	480 cm2 (ECETOC standard value). It should be noted that due to the corrosive nature of sulphur trioxide, dermal exposure is not considered relevant for risk characterisation, as it must be prevented in any case.
Room volume and speed of ventilation	n.a. (not relevant, as workers work in controlled environments, without direct contact with equipment using the substance)
Scenarios	**Risk management measures**
Containment measures and good necessary practices Local suction not required	Specific equipment with high containment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outside. Loading and unloading of oleum containers takes place outside. The gas spilled from the containers is piped to treatment (e.g. flushing and/or filtration).
Personal protective equipment (IPR)	Specific high-containment equipment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outdoors Workers involved in the sampling and transfer of tanker materialsare trained in the procedures and means of protection (hard hat, acid-proof glovesand boots, face and eye protection PPE and protective overalls) to minimise exposure and risks.
Other risk management measures for workers	An emergency shower is required in the vicinity of the loading stations anddischarge, to be used in case of accidental releases.

Section 2.2	Environmental exposure control

Molecular weight	80,06
Product features	Liquid
Vapour pressure	9730 Pa
Solubility in water	10000 mg/L Representative value used in models as oleum hydrolyses rapidly in water to form sulphuric acid which is highly soluble.
Partition coefficient nottanol/ water	-1 (logKow)
Koc	1
Biodegradability	Non-biodegradable (inorganic acids cannot be consideredbiodegradable)
Quantities used	n.a.
Frequency and duration	365 days/year
Waste water treatment plant discharge volume	2000 m3/day (EUSES standard value for local STPs)
Available flow rate of the receiving water body to which the site's wastewater is sent	20,000 m3/day (Standard ERC flow value allowing 10-fold dilution in the receiving water body)
On-site waste water pre-treatment.	Chemical pre-treatment or on-site STP plant. Wastewater is generally treated on-site by chemical and/or biological methods before being sent to the external treatment plant or the environment.
On-site waste treatment	All sludge is collected and treated for metal recovery, then sent to incineration or landfill.
Quantity of the substance in waste water from the uses identified in this scenario	0 kg/day (value based on specialised wastewater treatment procedures)
Amount of substance in waste from articles	n.a.
Type of waste (appropriate codes)	Appropriate codes from European Waste List
Type of external treatment for recycling or recovery of the substance	None
Type of external treatment for final waste disposal	Recovery of residual metal, Incineration or landfill.
Fraction of the substance released into the air during waste handling	n.a.
Fraction of the substance released in waste water during waste handling	n.a.
Fraction of substance disposed of as secondary waste	n.a.
Section 3	**Exposure Estimation**
3.1. Health	
Tier 1 assessment: the inhalation exposure assessment was performed using the ECETOC TRA modelInput parameters for the model	

	Parameter
Molecular weight	80.06 g/mol
Vapour pressure	9730 Pa
Product form	Liquid
Dustiness	n.a. (only in the case of solid materials)
Duration of activity	>4 hours
Ventilation	Indoor environments with LEV

Use of respiratory protection	Yes, 95 per cent efficiency

Tier 2 assessment: The inhalation exposure assessment was performed using theART model

Input parameters for the ART model

Type of parameters	PROC	Parameter
Duration of exposure	All	480 minutes
Type of product	All	Liquid
Process temperature	1	High temperatures (50-150°C)
	8b, 9	Ambient temperature (15-25°C)
Vapour pressure	All	9730 Pa
Liquid fraction weight	All	Substantial component (10-50%)
Localisation of the primary emission source	All	The primary emission source is not located in the breathing zone of the workers (workers located in the control room)
Activity class	All	Transfer of liquid products
Containment	1, 9	Handling with reduced contact between product and surrounding air, submerged loading
	8b	n.a. bottom loading
Localised control systems	All	Vapour recovery system; forced local exhaust (LEV)
Segregation	1, 9	Complete separation of workers, operating from control room
	8b	Partial separation of workers
Sources of fugitive emissions	All	Fully closed process - not open for sampling activities
Dispersion	1	Outdoors near buildings, workers must be at a distance >4 metres from the source
	8b	Outdoors near buildings, workers must be at a distance >4 metres from the source
	9	Inside, any room size, good natural ventilation

estimated acute and chronic inhalation exposures are for all process categories below the respective DNELs

3.2. Environment

Tier 1 evaluation: this was carried out using the EUSES model and standard input data and ERCs.The

Tier 1 assessment was refined by a Tier 2 assessment.

Tier 2 evaluation: was carried out using the EUSES model and input data morerealistic description of sulphur trioxide.

Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	80,06	g/mol	
Vapour pressure at 25°	9730	Pa	
Solubility in water	1000	mg/L	
Partition coefficient n-octanol/water	-1	LogKow	
Koc	1		
Biodegradability	Non-biodegradable		
Life cycle phase	Formulation		
Environmental release class	ERC2		
Regional tonnage fraction (Tier 1)			1

STP			Yes
Issuing events per year	330	days	20
Release to air (standard value) for	2,5	%	2,5

worst case			
Release to water (standard value)	2	%	2
Dilution factor applied for PEC derivation			10 (20,000 m3/day)

Risk mitigation measures and Description of measures on EUSES	measured values used in Details	Tier 2 assessment Effects considered in entries	Notes
No release to wastewater concentration to 0 mg/l in view neutralisation process	0 mg/l approx.of the high efficiency of the	Reduction of the STP effluent	Total neutralisation at pH 7
Days of issue year	360 issuing days per 20 per cent	Increase in emission days by	Continuous use
Sludge removal sent to incineration or landfill	Sludge removed and sludge set to 0.	Concentration in soil from agricultural land and	No contamination of grassland

ERC Expected re	Compartments release into the environment (Tier 2)	Planned releases	Explanation/source of data
2	Freshwater (after STP)	0 kg/day	Based on efficient neutralisation
	Release into the air	5.210 kg/day	
	Soil (only directly) Agricultural soil	0 kg/day	No leakage directly to the ground is expected forthis ERC and no sludge spreading

Estimated concentrations for all environmental compartments are below their respective PNECs

Section 4	**Guidance for assessing whether you are operating within the limits set by the scenario**

4.1. Health

Exposures are not expected to exceed acute and chronic inhalation DNELs for local effects when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.1.1 Health - Uses not recommended

n.a.

4.2. Environment

Exposures are not expected to exceed the PNECs when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.2.1 Environment - Uses not recommended

n.a.

1 Exposure scenario (3 of 4) **Use of oleum as an intermediate (Industrial use)**	
Life Cycle Phase Related Use Descriptors	PROC1/8b/9/15 ERC6a
Description of the environmental scenario (1) and corresponding environmental release category (ERC)	1. Industrial use resulting in the production of another substance (use of intermediates) (ERC6a)
List of worker scenario names (2) and corresponding process categories (PROC)	1. Use in a closed process, exposure unlikely (PROC1) 2. Transfer of a substance or mixture (filling/emptying) from/to vessels/large containers in dedicated facilities (PROC8b) 3. Transfer of a substance or mixture into small containers (dedicated filling line, including weighing) (PROC9) 4. Use as laboratory reagents (PROC15)
Exposure Criteria of the SE	SCOEL: - 0.05 mg/m³ - 8 hours TWA - 0.1 mg/m³ - 15 min. TWA
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product features	
Type of product to which the information relates	Substance as such: the product is in liquid form in a sealed container in both cases.
Product form	Liquid
Molecular weight	80,06
Concentration of the substance in the product	>98%
Quantities used	Contact with operators is generally very low, given that the most operations are controlled from a remote location and that sampling/analysis activities are of short duration
Frequency and duration	8 hours/day for 220 days/year
Other inherent information duration, frequency and amount of use	Sporadic contacts may occur
Respiratory volume below conditions of use	10 m3/day (standard value for 8 working hours per day)
Surface of skin contact with the substance under conditions of use	480 cm2 (ECETOC standard value). It should be noted that due to the corrosive nature of oleum, exposure dermal is not considered relevant for risk characterisation, in how much must be prevented in any case.
Room volume and speed of ventilation	n.a. (not relevant, as workers work in controlled environments, without direct contact with equipment using the substance)
Scenarios	**Risk management measures**
Containment measures and good necessary practices Local suction if required	Specific equipment with high containment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outside. Loading and unloading of oleum containers takes place outside.
Personal protective equipment (IPR)	Specific high-containment equipment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outdoors Workers involved in the sampling and transfer of tanker materialsare trained in the procedures and means of protection (hard hat, acid-proof glovesand boots, face and eye protection PPE and protective overalls) to minimise exposure and risks.
Other risk management measures for workers	An emergency shower is required in the vicinity of the loading stations anddischarge, to be used in case of accidental releases.
Section 2.2	**Environmental exposure control**

Molecular weight	80,06
Product features	Liquid
Vapour pressure	9730 Pa
Solubility in water	10000 mg/L Representative value used in models as oleum hydrolyses rapidly in water to form sulphuric acid which is highly soluble.
Partition coefficient n-octanol/water	-1 (logKow)
Koc	1
Biodegradability	Non-biodegradable (inorganic acids cannot be considered biodegradable)
Quantities used	10000 t/a
Frequency and duration	365 days/year
Waste water treatment plant discharge volume	2000 m3/day (EUSES standard value for local STPs)
Available flow rate of the receiving water body to which the site's wastewater is sent	20,000 m3/day (Standard ERC flow value allowing 10-fold dilution in the receiving water body)
On-site waste water pre-treatment.	Generally treated in the on-site plant (WWTP), which carries out neutralisation before being sent to the biological treatment stage of the WWTP or before sending to external plant or environment.
Quantity of substance present in discharges from the site to the external sewage system	The neutralisation process is extremely efficient. pH monitoring allows the complete neutralisation and removal of the substance to be verified.
Reduction of air emissions	Treated with scrubbers.
On-site waste treatment	The neutralisation process of waste water is extremely efficient. pH monitoringmakes it possible to verify complete neutralisation and substance removal
Effluent discharge rates (of waste water treatment plants)	2000 m3/day
Sludge recovery for use in agriculture	No. All sludge is collected and sent to incineration or landfill
Quantity of the substance in waste water from the uses identified in this scenario	0 kg/day (value based on specialised wastewater treatment procedures)
Amount of substance in waste from articles	n.a.
Type of waste (appropriate codes)	Appropriate codes from European Waste List
Type of external treatment for recycling or recovery of the substance	None
Type of external treatment for final waste disposal	Incineration or landfill
Fraction of the substance released into the air during waste handling	n.a.
Fraction of the substance released in waste water during waste handling	n.a.
Fraction of substance disposed of as secondary waste	n.a.
Section 3	**Exposure Estimation**

3.1. Health
Tier 1 assessment: the inhalation exposure assessment was performed using the ECETOC TRA model

	Parameter
Molecular weight	80.06 g/mol
Vapour pressure	9730 Pa
Input parameters for the model	
Product form	Liquid
Dustiness	n.a.
Duration of activity	>4 hours
Ventilation	Indoor environments with LEV
Use of respiratory protection	Yes, 95 per cent efficiency

Tier 2 assessment: the inhalation exposure assessment was performed using the ART model

	PROC	Parameter
Duration of exposure	1, 8b, 9	>480 minutes
Input parameters for the ART model		
Type of product	All	Liquid
Process temperature	1	High temperatures (50-150°C)
	8b, 9	Ambient temperature (15-25°C)
Vapour pressure	All	9730 Pa
Liquid fraction weight	All	Pure liquid (100%)
Location of the primary emission source	All	The primary emission source is not located in the breathing zone of the workers (workers located in the control)
Activity class	All	Transfer of liquid products
Containment	1, 9	Handling with reduced contact between product and surrounding air, submerged loading
	8b	n.a.
Localised control systems	1, 8b, 9	Vapour recovery system; suction local forced (LEV)
Segregation	1, 9	Complete separation of workers, control room operators
	8b	Partial separation of workers
Sources of fugitive emissions	1, 8b, 9	Fully closed process - not open for sampling activities
Dispersion	1	Outdoors near buildings, workers must be at a distance >4 metres from the source
	8b	Outdoors near buildings, workers must be at a distance >4 metres from the source
	9	Inside, any size environment, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below the respective DNELs

3.2. Environment

Tier 1 evaluation: this was carried out using the EUSES model and standard input data and ERCs.The
Tier 1 assessment estimated an exposure that was considered unrealistic.
Tier 2 assessment: was carried out using the EUSES model and including input data more relevant to the description of sulphur trioxide production and uses.
Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	80,06	G/mol	

Vapour pressure at 25°	9730	Pa	
Solubility in water	Miscible	Mg/ml	
Partition coefficient n-octanol/water	-1	LogKow	

Koc	1		
Biodegradability	Non-biodegradable		
Life cycle phase	Industrial use		
Environmental release class	ERC6a		
Regional Tonnage Fraction (Tier 1)			1
STP			Yes
Issuing events per year	Up to 360	days	300
Release to air (standard value)	5	%	5
Release to water (standard value)	2	%	2
Dilution factor applied for PEC derivation			10 (20,000 m3/day)

Risk mitigation measures and	measured values used in	Tier 2 assessment	
Description of measures on EUSES	Details	Effects considered in entries	Notes
No release in the sewage	0 mg/l	Reduction of the STP effluent concentration to 0 mg/l in view	Total neutralisation at approx. pH 7
of the high efficiency of the	neutralisation process		
Days of issue year	365 issue days per 20 per cent	Increase in emission days by	Continuous use
Sludge removal sent to incineration or landfill	Sludge removed and sludge set to 0.	Concentration in soil from agricultural land and	No contamination of grassland

ERC	Compartments	Planned releases	Explanation/source of data
Expected release into the environment (Tier 2)			
6a	Freshwater (after STP)	833 kg/day	Predicted values are those calculated by EUSES using the tonnage data and default settings for ERC6A
	Release into the air	2,080 kg/day	Emissions are those calculated by EUSES for ERC6a
	Soil (only directly) Agricultural soil	0 kg/day	No leakage directly to the ground is expected forthis ERC and no sludge spreading

Estimated concentrations for all environmental compartments are below their respective PNECs

Section 4	**Guidance on whether you are operating within the limits set by the scenario**

4.1. Health

Exposures are not expected to exceed acute and chronic inhalation DNELs for local effects when the Risk Management Measures/Operational Conditions outlined in Section 3.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.1.1 Health - Uses not recommended

n.a.

4.2. Environment

Exposures are not expected to exceed PNECs when Risk Management Measures/Conditions are applied Operational illustrated in Section 3
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.2.1 Environment - Uses not recommended

n.a.

1 Exposure scenario (4 of 4) **Use of Oleum as nitration agent (Industrial use)**	
Life Cycle Phase Related Use Descriptors	PROC1/8b/9/15 ERC6b
Description of the environmental scenario (1) and corresponding environmental release category (ERC)	1. Industrial use of reactive processing aids (ERC6b)
List of worker scenario names (2) and corresponding process categories (PROC)	1. Use in a closed process, exposure unlikely (PROC1) 2. Transfer of a substance or mixture (filling/emptying) from/to vessels/large containers in dedicated facilities (PROC8b) 3. Transfer of a substance or mixture into small containers (dedicated filling line, including weighing) (PROC9) 4. Use as laboratory reagents (PROC15)
Exposure Criteria of the SE	SCOEL: - 0.05 mg/m³ - 8 hours TWA - 0.1 mg/m³ - 15 min. TWA
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product features	
Molecular weight	80,06
Product form	Liquid
Concentration of the substance in the product	20-25% (concentration usually used)
Quantities used	Contact with operators is generally very low, given that the most operations are controlled from a remote location and that sampling/analysis activities are of short duration
Frequency and duration	8 hours/day for 220 days/year
Other information on duration, frequency and amount of use	Sporadic contacts may occur
Respiratory volume under conditions of use	10 m3/day (standard value for 8 working hours per day)
Surface of skin contact with the substance under conditions of use	480 cm2 (ECETOC standard value). It should be noted that due to the corrosive nature of oleum, dermal exposure is not considered relevant for risk characterisation, as it must be prevented in any case. .
Room volume and speed of ventilation	n.a. (not relevant, as workers work in controlled environments, without direct contact with equipment using the substance)
Scenarios	**Risk management measures**
Containment measures and good necessary practices Local suction if required	Specific equipment with high containment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outside. The loading and unloading of oleum containers takes place outside. The gas spilled from the containers is piped to treatment (e.g. washing and/or filtration).
Personal protective equipment (IPR)	Specific high-containment equipment is used in the production and handling of oleum. The facilities involved in the production and use of oleum are generally located outdoors Workers involved in the sampling and transfer of tanker materialsare trained in the procedures and means of protection (hard hat, acid-proof glovesand boots, face and eye protection PPE and protective overalls) to minimise exposure and risks.
Other risk management measures for workers	An emergency shower is required in the vicinity of the loading stations anddischarge, to be used in case of accidental releases.
Section 2.2	**Environmental exposure control**
Molecular weight	80.06 g/mol

Product features	Liquid
Vapour pressure	9730 Pa
Solubility in water	10000 mg/L Representative value used in models as oleum hydrolyses rapidly in water to form sulphuric acid which is highly soluble.
Partition coefficient noctanol/water	-1 (logKow)
Koc	1
Biodegradability	Non-biodegradable (inorganic acids cannot be consideredbiodegradable)
Quantities used	n.a.
Frequency and duration	365 days/year
Waste water treatment plant discharge volume	2000 m3/day (EUSES standard value for local STPs)
Available flow rate of the receiving water body to which the site's wastewater is sent	20,000 m3/day (Standard ERC flow value allowing 10-fold dilution in the receiving water body)
On-site waste water pre-treatment.	Generally treated in the on-site plant (WWTP), which carries out neutralisation before being sent to the biological treatment stage of the WWTP or before sending to external plant or environment.
Quantity of substance in discharges from the site to the external sewage system	The neutralisation process is extremely efficient. pH monitoring allows thecomplete neutralisation and removal of the substance to be verified.
Reduction of air emissions	Treated with scrubbers.
On-site waste treatment	The neutralisation process of waste water is extremely efficient. pH monitoringmakes it possible to verify complete neutralisation and substance removal
Effluent discharge rates (of waste water treatment plants)	2000 m3/day
Sludge recovery for use in agriculture	No. All sludge is collected and sent to incineration or landfill
Quantity of the substance in waste water from the uses identified in this scenario	0 kg/day (value based on specialised wastewater treatment procedures)
Amount of substance in waste from articles	n.a.
Type of waste (appropriate codes)	Appropriate codes from European Waste List
Type of external treatment for recycling or recovery of the substance	None
Type of external treatment for final waste disposal	Incineration or landfill
Fraction of the substance released into the air during waste handling	n.a.
Fraction of the substance released in waste water during waste handling	n.a.
Fraction of substance disposed of as secondary waste	n.a.
Section 3	**Exposure Estimation**
3.1. Health	
Tier 1 assessment: the inhalation exposure assessment was performed using the ECETOC TRA modelInput parameters for the model	
	Parameter

Molecular weight	80.06 g/mol

Vapour pressure	9730 Pa
Product form	Liquid
Dustiness	n.a.
Duration of activity	>4 hours
Ventilation	Indoor environments with LEV , 95% efficiency
Use of repiratory protection	Yes, 95 per cent efficiency

The exposure estimation with ECETOC was considered unsatisfactory and not relevant for therisk characterisation

Tier 2 assessment: the inhalation exposure assessment was performed using the ART modelInput parameters for the ART model

	PROC	Parameter
Duration of exposure	1, 8b, 9	480 minutes
	15	120 minutes
Type of product	All	Liquid
Process temperature	1	High temperatures (50-150°C)
	8b, 9,15	Ambient temperature (15-25°C)
Vapour pressure	All	9730 Pa
Liquid fraction weight	All	Substantial component (10-50%)
Localisation of the primary emission source	1, 8b, 9	The primary emission source is not located in the breathing zone of the workers (workers located in the control room)
	15	The primary emission source is located in the breathing zone of workers (within 1 metre)
Activity class	All	Transfer of liquid products
Containment	1, 9	Handling with reduced contact between productand surrounding air
	8b	n.a.
	15	Open process, spray filling
Localised control systems	1, 8b, 9	Vapour recovery system; forced local exhaust (LEV)
	15	LEV; boxes of gloves
Segregation	1, 9	Complete separation of workers, operating from control room
	8b	Partial separation of workers
Sources of fugitive emissions	1, 8b, 9	Fully closed process - not open for sampling activities
	15	Not completely closed - good effective practices in place
Dispersion	1	Outdoors near buildings, workers must be at a distance >4 metres from the source
	8b	Outdoors near buildings, workers must be at a distance >4 metres from the source
	9, 15	Inside, any size environment, good natural ventilation

The estimated acute and chronic inhalation exposures are for all process categories below the respective DNELs

3.2. Environment

Tier 1 evaluation: this was carried out using the EUSES model and standard input data and ERCs.The
Tier 1 assessment estimated an exposure that was considered unrealistic.
Tier 2 assessment: was carried out using the EUSES model and including input data more relevant to the description of sulphur trioxide production and uses.
Input parameters for the EUSES model.

Input parameters	Value	Unit	Standard ERC (if applicable)
Molecular weight	80,06	g/mol	
Vapour pressure at 20°	9730	Pa	

Solubility in water	1000	mg/ml	
Partition coefficient n-octanol/water	-1	LogKow	
Koc	1		
Biodegradability	Non-biodegradable		
Life cycle phase	Industrial use		
Environmental release class	ERC6b		
Regional Tonnage Fraction (Tier 1)			1
STP			Yes
Issuing events per year	Up to 360	days	300 (depending on tonnage range and usage)
Release to air (standard value)	0,1	%	0,1
Release to water (standard value)	5	%	5
Dilution factor applied for PEC derivation			10 (20,000 m3/day)

Risk mitigation measures and measured values used in Tier 2 assessment			
Description of measures on EUSES	Details	Effects considered in entries	Notes
No release in the sewage	0 mg/l	Reduction of the STP effluent concentration to 0 mg/l in view of the high efficiency of the neutralisation process	Total neutralisation at pH 7 approx.
Days of issue year	360 issuing days per 20 per cent	Increase in emission days by	Continuous use
Sludge removal sent to incineration or landfill	Sludge removed and sludge set to 0.	Concentration in soil from agricultural land and	No contamination of grassland

ERC	Compartments	Planned releases	Explanation/source of data
Expected release into the environment (Tier 2)			
6b	Freshwater (after STP)	0 kg/day	Based on effective neutralisation and pre-treatment
	Release into the air	13.9 kg/day	Emissions are those calculated by EUSES for ERC6a
	Soil (only directly) Agricultural soil	0 kg/day	No leakage directly to the ground is expected forthis ERC and no sludge spreading

Estimated concentrations for all environmental compartments are below their respective PNECs

Section 4	**Guidance for assessing whether you are operating within the limits set by the scenario**

4.1. Health

Exposures are not expected to exceed acute and chronic inhalation DNELs for local effects when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.1.1 Health - Uses not recommended

n.a.

4.2. Environment

Exposures are not expected to exceed the PNECs when the Risk Management Measures/Operational Conditions outlined in Section 3 are applied.
Where different Risk Management Measures/Operational Conditions are adopted, users are required to ensure that risks are managed to at least an equivalent level.

4.2.1 Environment - Uses not recommended

n.a.