SAFETY DATA SHEET

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

1.1 Product identifier

Product name: Acetic Anhydride, Reagent Grade

Product No.: AANHR

Synonyms, Trade Names: 18160-00

Additional identification

Chemical name:	acetic anhydride
REACH Registration No.:	01-2119486470-36-0003 01-2119486470-36-0004
CAS-No.:	108-24-7

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

Identified uses: Please refer to the Annex for a listing of uses.
Uses advised against: None known.

1.3 Details of the supplier of the safety data sheet

Manufacturer / Supplier

Lab Alley LLC
22111 Highway 71 West, Suite 601
Spicewood, Texas 78669
Tel.: 512-668-9918

Visit our website at www.laballey.com or email customerservice@laballey.com

National Supplier

Lab Alley LLC
22111 Highway 71 West, Suite 601
Spicewood, Texas 78669
Tel.: 512-668-9918

1.4 Emergency telephone number:

InfoTrac: 800-535-5053

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

The product has been classified according to the legislation in force.

EU. GHS Classification. CLP Regulation (EC) No 1272/2008, Annex VI, Table 3.1, List of harmonized classification and labeling of hazardous substances

Physical hazards		
Flammable liquids	Category 3	H226: Flammable liquid and vapour.
Health hazards		
Acute toxicity (Oral)	Category 4	H302: Harmful if swallowed.
Acute toxicity (Inhalation)	Category 2	H330: Fatal if inhaled.
Skin corrosion/irritation	Category 1B	H314: Causes severe skin burns and eye damage.

Hazard summary

Physical hazards: Flammable liquid and vapor.

Health hazards

Inhalation: Fatal if inhaled.

Eye contact: Causes severe eye burns.

Skin contact: Causes severe skin burns.

Ingestion: Harmful if swallowed.

Other Health Effects: No data available.

Environmental hazards: None known.

C: Corrosive
R10: Flammable.
R20/21: Harmful by inhalation and in contact with skin.
R34: Causes burns.

2.2 Label elements

Signal words: DANGER!

Hazard Statement(s): H226: Flammable liquid and vapor.
H302: Harmful if swallowed.
H330: Fatal if inhaled.
H314: Causes severe skin burns and eye damage.

Precautionary statement

Prevention: P210: Keep away from heat/sparks/open flames/hot surfaces. No smoking. P233: Keep container tightly closed. P240: Ground/bond container and receiving equipment. P241: Use explosion-proof electrical/ventilating/lighting/equipment. P243: Take precautionary measures against static discharge. P280: Wear protective gloves/protective clothing/eye protection/face protection. P270: Do not eat, drink or smoke when using this product. P264: Wash hands thoroughly after handling. P260: Do not breathe dust/fume/gas/mist/vapors/spray. P271: Use only outdoors or in a well-ventilated area. P242: Use only non-sparking tools. P284: Wear respiratory protection.

Response: P303+P361+P353: IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/shower. P370+P378: In case of fire: Use (/$/<atnam>/$/) for extinction. P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. P330: Rinse mouth. P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. P310: Immediately call a POISON CENTER or doctor/physician. P363: Wash contaminated clothing before reuse. P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage: P403+P233: Store in a well-ventilated place. Keep container tightly closed. P405: Store locked up.

Disposal: P501: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards: None known.

SECTION 3: Composition/information on ingredients

3.1 / 3.2 Substances / Mixtures

General information:

Chemical name	Concentration	Additional identification	Notes
acetic anhydride	94,0000 - 100,0000%	CAS-No.: 108-24-7 EC No.: 203-564-8 INDEX No.: 607-008-00-9 REACH Registration No.: 01-2119486470-36-	

		0003 01-2119486470-36-0004	
acetic acid	0,0001 - 6,0000%	CAS-No.: 64-19-7 EC No.: 200-580-7 INDEX No.: 607-002-00-6 REACH Registration No.: 01-2119475328-30-0004 01-2119475328-30-0005	#

Explanation for Notes (if applicable):
* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
# This substance has w orkplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

Classification

Chemical name	Classification		Notes
acetic anhydride	DSD:	C, R10, R20/22, R34	
	CLP:	Flam. Liq. 3, H226; Acute Tox.4, H302; Acute Tox.4, H332; Skin Corr.1B, H314; Eye Dam.1, H318	
acetic acid	DSD:	C, R10, R35	
	CLP:	Flam. Liq. 3, H226; Skin Corr.1A, H314	

DSD: Directive 67/548/EEC.
CLP: Regulation No. 1272/2008.:

The full text for all R- and H-phrases is displayed in section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation: Move to fresh air. If breathing stops, provide artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately. In case of irritation from airborne exposure, move to fresh air. Get medical attention if symptoms persist.

Skin contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician or poison control center immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Ingestion: Call a physician or poison control center immediately. Do NOT induce vomiting. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head lower than the hips to help prevent aspiration.

4.2 Most important symptoms and effects, both acute and delayed: No data available.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: No data available.

Treatment: Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards: USE WATER WITH CAUTION. Material reacts with water.

5.1 Extinguishing media

Suitable extinguishing media: Carbon Dioxide. Dry chemical. Alcohol foam.

Unsuitable extinguishing media: Water.

5.2 Special hazards arising from the substance or mixture: Reacts violently with water. Contact with moisture or water may generate sufficient heat to ignite nearby combustible materials.

5.3 Advice for firefighters

Special fire fighting procedures: Fight fire from a protected location. Keep away from combustible material. Use water spray to keep fire-exposed containers cool. Do not allow water to get into container because of violent reaction and possible flash fire.

Special protective equipment for fire-fighters: Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures: Wear appropriate personal protective equipment.

6.2 Environmental precautions: Do not release into the environment.

6.3 Methods and material for containment and cleaning up: Eliminate sources of ignition. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Large Spillages: Neutralize spilled material with crushed limestone, soda ash or lime. Cover with sand or earth. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

Notification Procedures: In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Do not get in eyes, on skin, on clothing. Do not breathe mist or vapor. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities: Keep container tightly closed and dry. Contents may develop pressure if exposed to water.

7.3 Specific end use(s): Chemical Intermediate

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits

Country specific exposure limits have not been established or are not applicable unless listed below.

Chemical name	Type	Exposure Limit values	Source
acetic acid	TWA	10 ppm 25 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)

DNEL-Values

Critical component	Type	Route of Exposure		Remarks
acetic anhydride	Workers (industrial/professional)	DNEL Human inhalation, short-term (acute):,local	12,6 mg/m3	
acetic anhydride		DNEL Human inhalation long-term (repeated):,systemic	4,2 mg/m3	
acetic anhydride		DNEL Human inhalation long-term (repeated):,local	4,2 mg/m3	
acetic acid		DNEL Human inhalation, short-term (acute):,local	25 mg/m3	
acetic acid		DNEL Human inhalation long-term (repeated):,local	25 mg/m3	
acetic acid	General Population	DNEL Human inhalation, short-term (acute):,local	25 mg/m3	
acetic acid		DNEL Human inhalation long-term (repeated):,local	25 mg/m3	

PNEC-Values

Critical component	Environmental compartment		Remarks
acetic anhydride	Water	3,06 mg/l	

acetic anhydride	Seawater	0,306 mg/l	
acetic anhydride	Freshwater Sediment	11,4 mg/kg	wet
acetic anhydride	Saltwater Sediment	1,14 mg/kg	wet
acetic anhydride	Soil	0,478 mg/kg	wet
acetic anhydride	Sewage Treatment Plant	115 mg/l	
acetic anhydride	Aqua Intermittent	30,58 mg/l	
acetic acid	Water	3,06 mg/l	
acetic acid	Seawater	0,306 mg/l	
acetic acid	Aqua Intermittent	30,58 mg/l	
acetic acid	Freshwater Sediment	11,4 mg/kg	wet
acetic acid	Saltwater Sediment	1,14 mg/kg	wet
acetic acid	Soil	0,478 mg/kg	wet
acetic acid	Sewage Treatment Plant	85 mg/l	

8.2 Exposure controls

Appropriate engineering controls: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

General information: All information for relevant exposure scenarios including risk management measures are listed in the Annex. Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.

Eye/face protection: Use safety goggles and face shield in case of splash risk.

Skin protection

Hand protection: Butyl rubber gloves are recommended. Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves.

Other: Any specific clothing information provided is based on published literature and manufacturer data. Body protection suitability and breakthrough time will differ depending on the specific use conditions. Clothing to be considered for this material may include sleeves, aprons, pants depending on the use and likelihood of skin contact. Please refer to the hand protection section for material type.

Respiratory Protection:	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Respirator type: Chemical respirator with organic vapor cartridge and full facepiece. Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information. For high airborne concentrations, use an approved supplied-air respirator. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas warning properties are poor, or if air purifying filter rating may be exceeded.
Hygiene measures:	Observe good industrial hygiene practices.
Environmental Controls:	All information for relevant exposure scenarios including risk management measures are listed in the Annex.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical State:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Strong sour/acidic
Odor Threshold:	0,117 ppm
pH:	No data available.
Freezing Point:	-73 °C
Boiling Point:	139,5 °C
Flash Point:	49 °C
Evaporation Rate:	No data available.
Flammability (solid, gas):	Flammable.
Flammability Limit - Upper (%)–:	10,3 %(V)
Flammability Limit - Lower (%)–:	2,7 %(V)
Vapor pressure:	0,68 kPa (25 °C)
Vapor density (air=1):	3,5
Specific Gravity:	1,082 (20 °C)
Solubility(ies)	
Solubility in Water:	0,12 g/l (20 °C)
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	log Pow: -0,58
Autoignition Temperature:	316 °C
Decomposition Temperature:	No data available.
Dynamic Viscosity:	0,842 mPa.s (25 °C)
Kinematic viscosity:	0,77 mm2/s (25 °C)

Explosive properties:	Not classified
Oxidizing properties:	Not classified

SECTION 10: Stability and reactivity

10.1 Reactivity:	Reacts violently with water.
10.2 Chemical stability:	Stable
10.3 Possibility of hazardous reactions:	Can decompose at elevated temperatures.
10.4 Conditions to avoid:	Excessive heat. Contact with water. Moist air. Incompatible materials.
10.5 Incompatible materials:	Alcohols. Bases. Water.
10.6 Hazardous decomposition products:	Carbon Dioxide. Carbon Monoxide.

SECTION 11: Toxicological information

Information on likely routes of exposure

Inhalation:	No data available.
Ingestion:	Harmful if swallowed.
Skin contact:	Causes severe skin burns.
Eye contact:	Causes severe eye burns.

11.1 Information on toxicological effects

Acute Toxicity

Oral

Product:	No data available.
Specified substance(s)	
acetic anhydride	Oral LD-50: (Rat): 630 mg/kg

Dermal

Product:	No data available.
Specified substance(s)	
acetic anhydride	Dermal LD-50: (Rabbit): 4.000 mg/kg

Inhalation

Product:	No data available.
Specified substance(s)	
acetic anhydride	LC50 (Rat, 4 h): 1,25 mg/l

Repeated dose toxicity

Product:	No data available.

Specified substance(s)
acetic anhydride — LOAEC (Rat, Inhalation study:, 14 d): 25 ppm

Skin corrosion/irritation:
Product: No data available.

Specified substance(s)
acetic anhydride — (Rabbit, 24 h): Severe

Serious eye damage/eye irritation:
Product: No data available.

Specified substance(s)
acetic anhydride — (Rabbit): Severe

Respiratory or skin sensitization:
Product: No data available.

Specified substance(s)
acetic anhydride — No data available.

Mutagenicity

In vitro
Product: No data available.

Specified substance(s)
acetic anhydride — Salmonella typhimurium assay (Ames test), Bacterial Reverse Mutation Assay : negative +/- activation

In vivo
Product: No data available.

Specified substance(s)
acetic anhydride — Mutagenicity - Mammalian (Mammalian Bone Marrow Chromosome Aberration Test) Inhalation - vapor (Rat): negative Read-across from a similar material

Carcinogenicity
Product: No data available.

Specified substance(s)
acetic anhydride — No data available.

Reproductive toxicity
Product: No data available.

Specified substance(s)
acetic anhydride — No data available.

Specific target organ toxicity - single exposure
Product: No data available.

Specified substance(s)
acetic anhydride — Inhalation - dust and mist: Respiratory tract irritation.

Specific target organ toxicity - repeated exposure

Product: No data available.

Specified substance(s)

acetic anhydride: No data available.

Aspiration hazard

Product: No data available.

Specified substance(s)

acetic anhydride: No data available.

Other adverse effects: No data available.

SECTION 12: Ecological information

12.1 Toxicity

Acute toxicity

Fish

Product: No data available.

Specified substance(s)

acetic anhydride: LC-50 (Fish, 96 h): 300,82 mg/l Read-across from a similar material

Aquatic invertebrates

Product: No data available.

Specified substance(s)

acetic anhydride: EC-50 (daphnid, 48 h): 300,82 mg/l Read-across from a similar material

Chronic Toxicity

Fish

Product: No data available.

Specified substance(s)

acetic anhydride: No data available.

Aquatic invertebrates

Product: No data available.

Specified substance(s)

acetic anhydride: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Specified substance(s)

acetic anhydride: EC-50 (Alga, 72 h): 300,82 mg/l Read-across from a similar material

12.2 Persistence and degradability

Biodegradation

Product: No data available.

Specified substance(s)
acetic anhydride — 96 % (20 d) Readily biodegradable Read-across from a similar material

Biological Oxygen Demand:
Product — No data available.

Specified substance(s)
acetic anhydride — No data available.

Chemical Oxygen Demand:
Product — No data available.

Specified substance(s)
acetic anhydride — No data available.

BOD/COD ratio
Product — No data available.

Specified substance(s)
acetic anhydride — No data available.

12.3 Bioaccumulative potential
Product: — No data available.

Specified substance(s)
acetic anhydride — No data available.

12.4 Mobility in soil: — log Koc: 0,146 (QSAR model) Read-across from a similar material

12.5 Results of PBT and vPvB assessment: — No data available.

acetic anhydride — Not fulfilling PBT (persistent/bioaccumulative/toxic) criteria

12.6 Other adverse effects: — No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: — No data available.

Disposal methods: — Dispose of waste and residues in accordance with local authority requirements. Incinerate. Since emptied containers retain product residue, follow label warnings even after container is emptied.

European Waste Codes
Comply with requirements of waste disposal legislation and any local authority requirements.

SECTION 14: Transport information

Important Note: Shipping descriptions may vary based on mode of transport, quantities, package size, and/or origin and destination. Consult your company's Hazardous Materials/Dangerous Goods expert for information specific to your situation.

ADR/RID

Possible Shipping Description(s):

UN 1715 ACETIC ANHYDRIDE
8 (3) II

IMDG - International Maritime Dangerous Goods Code

Possible Shipping Description(s):

UN 1715 ACETIC ANHYDRIDE 8 (3) II

IATA

Possible Shipping Description(s):

UN 1715 Acetic anhydride 8 (3) II

SECTION 15: Regulatory information

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

OSHA: hazardous

TSCA (US Toxic Substances Control Act): All components of this product are listed on the TSCA inventory. Any impurities present in this product are exempt from listing.

DSL (Canadian Domestic Substances List) and CEPA (Canadian Environmental Protection Act): All components of this product are listed on the DSL. Any impurities present in this product are exempt from listing.

AICS / NICNAS (Australian Inventory of Chemical Substances and National Industrial Chemicals Notification and Assessment Scheme): All components of this product are listed on AICS or otherwise comply with NICNAS.

MITI (Japanese Handbook of Existing and New Chemical Substances): All components of this product are listed in the Handbook or have been approved in Japan by new substance notification.

ECL (Korean Toxic Substances Control Act): All components of this product are listed on the Korean inventory or otherwise comply with the Korean Toxic Substances Control Act.

Philippines Inventory (PICCS) : All components of this product are listed on the Philippine inventory or otherwise comply with PICCS.

Inventory of Existing Chemical Substances in China: All components of this product are listed on the Inventory of Existing Chemical Substances in China (IECSC).

15.2 Chemical safety assessment:	Yes.

SECTION 16: Other information

Revision Information:	New SDS
Key literature references and sources for data:	No data available.
Wording of the R-phrases and H-statements in section 2 and 3:	C = Corrosive R10 = Flammable. R20/22 = Harmful by inhalation and if sw allowed. R34 = Causes burns. R10 = Flammable. R35 = Causes severe burns. Flam. Liq. = Flammable liquids Acute Tox. = Acute toxicity Acute Tox. = Acute toxicity Skin Corr. = Skin corrosion/irritation Eye Dam. = Serious eye damage/eye irritation 3 = Category 3 4 = Category 4 4 = Category 4 1B = Category 1B 1 = Category 1 H226= Flammable liquid and vapor. H302= Harmful if sw allowed. H332= Harmful if inhaled.

H314= Causes severe skin burns and eye damage.
H318= Causes serious eye damage.

Flam. Liq. = Flammable liquids
Skin Corr. = Skin corrosion
3 = Category 3
1A = Category 1A
H226= Flammable liquid and vapour.
H314= Causes severe skin burns and eye damage.

Training information: No data available.

Issue date: 24.08.2014
SDS No.:
Disclaimer: This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

Annex to the extended Safety Data Sheet (eSDS)

Acetic Anhydride, Reagent Grade

150000016156

Content

Summary

	Process categories [PROC]	Product categories [PC]:	Sector of uses [SU]	Article categories [AC]	Environmental release categories [ERC]
Manufacture of substance, Industrial use	PROC1 PROC2 PROC3 PROC4 PROC8b PROC15 PROC8b PROC8a PROC2		SU3 SU8 SU9		ERC1 ERC4 ERC6a
Distribution of substance, Industrial use	PROC1 PROC2 PROC3 PROC4 PROC3 PROC15 PROC8b PROC9 PROC8a PROC2		SU3 SU8 SU9		ERC1, ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC6c, ERC6d, ERC7
Formulation & (re)packing of substances and mixtures, Industrial use	PROC1 PROC2 PROC3 PROC4 PROC3 PROC15 PROC8b PROC5 PROC8a PROC8b PROC14 PROC9 PROC8a PROC2		SU3 SU10		ERC2
Use of small quantities within laboratory settings within closed or contained systems, including incidental exposures during material transfers and equipment cleaning., Industrial use	PROC15		SU3		ERC4
Use of small quantities within laboratory settings within closed or contained systems, including incidental exposures during material transfers and equipment cleaning., Professional use	PROC15		SU22		ERC8a

Exposure scenario I. Manufacture of substance, Industrial use

Section 1: Exposure scenario

Sector(s) of Use	SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals

List of names of contributing worker scenarios and corresponding PROCs	PROC1. PROC2. PROC3. PROC4. PROC8b. PROC15. PROC8b. PROC8a. PROC2.

Name of contributing environmental scenario and corresponding ERC	ERC1 ERC4 ERC6a

Other process or activity:	Manufacture of substance or use as an intermediate, process chemical or extracting agent. Includes recycling/recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container).

Section 2: Control of Exposure

Physical form of the product:	liquid
Vapour pressure:	0,68 kPa
Process temperature:	25 °C
Remarks	not relevant
Concentration of the substance in a mixture:	Covers percentage substance in the product up to 100 % (unless stated differently).

2.1. Control of Human Exposure

Other given operational conditions affecting workers exposure				
Area of use	**Room size:**	**Temperature:**	**Ventilation rate**	**Remarks**
Indoor/Outdoor use.	20 m3	25 °C		Liquid, vapour pressure 0,5 - 10 kPa at STP.

Frequency and duration of use	**Duration**	**Frequency of use:**	**Remarks**
Exposure time	8 h	5 days/week	

Name of contributing exposure scenario	Risk management measures (RMM)
General measures applicable to all activities:	Avoid direct skin or eye contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin or eye problems that may develop., Other protection measures such as impervious suits and face shields or goggles may be required during high dispersion activities which are likely to lead to substantial aerosol release.
General exposures (closed systems):	Handle substance within a closed system.
General exposures (closed systems), with sample collection, With occasional controlled exposure.:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.
General exposures (closed systems), Use in contained batch processes:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.Avoid carrying out activities involving exposure for more than 15 minutes.
General exposures (open systems), Batch process, with sample collection:	Ensure material transfers are under containment or extract ventilation.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 4 hours.
Process sampling:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 4 hours.
Laboratory activities:	Handle in a fume cupboard or under extract ventilation.Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Bulk transfers, (open systems), (closed systems), With potential for aerosol generation.:	Clear transfer lines prior to de-coupling.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure material transfers are under containment or extract ventilation.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 1 hour.
Equipment cleaning and maintenance:	Drain down and flush system prior to equipment break-in or maintenance.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.Avoid carrying out activities involving exposure for more than 15 minutes.
Storage, With occasional controlled exposure.:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Locate bulk storage outdoors., Store substance within a closed system.

2.2.Control of environmental exposure

Risk management measures (RMM)	Note: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Technical conditions and measures at process level (source) to prevent release	See chapter 8 of the safety data sheet (Environmental exposure controls).

Organisational measures to prevent/limit release from site:	none

Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	18.000 m3/d
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

ERC1: Manufacture of substances

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	0,48

Msafe	Annual amount per site: 14.400 tonnes/yr

Frequency and duration of use: Continuous process:	300 days/year Continuous release.

Other given operational conditions affecting environmental exposure					
type	**Emission days (days/year):**	**Emission factors**			**Remarks**
		Air	**Soil**	**Water**	

Continuous release.	300	0,5 %	0,01 %	1 %	ESVOC spERC 1.1.v1 Liquid, vapour pressure 0,5 - 10 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %	

Conditions and measures related to external treatment of waste for disposal		
Fraction of used amount transferred to external waste treatment:		
Suitable waste treatment	**Treatment effectiveness**	**Remarks**
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	0,96

Msafe	Annual amount per site: 28.800 tonnes/yr

Frequency and duration of use: Continuous process:	300 days/year Continuous release.

Other given operational conditions affecting environmental exposure					
type	**Emission days (days/year):**	**Emission factors**			**Remarks**
		Air	**Soil**	**Water**	
Continuous release.	300	10 %	0 %	0 %	ESVOC spERC 4.2.1a.v1 Liquid, vapour pressure 0,5 - 10 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %	

Conditions and measures related to external treatment of waste for disposal		
Fraction of used amount transferred to external waste treatment:		
Suitable waste treatment	**Treatment effectiveness**	**Remarks**
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements., Risk from environmental exposure is driven by soil.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage	60.000 tonnes/yr

(tons/year):	
Amounts used: Fraction of regional tonnage used locally:	0,24

Msafe	Annual amount per site: 7.200 tonnes/yr

Frequency and duration of use: Continuous process:	300 days/year Continuous release.

Other given operational conditions affecting environmental exposure

type	Emission days (days/year):	Emission factors			Remarks
		Air	Soil	Water	
Continuous release.	300	0,2 %	0,1 %	1 %	ESVOC spERC 6.1a.v1 Liquid, vapour pressure 0,5 - 10 kPa at STP.

Conditions and measures related to municipal sewage treatment plant

municipal:

Discharge rate:	2.000 m3/d

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

Section 3. Exposure estimation

3.1. Health:	*When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.*

General measures applicable to all activities

none

PROC1: Use in closed process, no likelihood of exposure *General exposures (closed systems)*

	Exposure level	RCR	Method	Remarks
Inhalation	0,01 ppm	0,01	Used ECETOC TRA model.	
Dermal	0,34 mg/kg bw/day	0,34	Used ECETOC TRA model.	
Various Routes		0,35	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *General exposures (closed systems), with sample collection, With occasional controlled exposure.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,84	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *General exposures (closed systems), Use in contained batch processes*

	Exposure level	RCR	Method	Remarks
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,38	Used ECETOC TRA model.	

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises *General exposures (open systems), Batch process, with sample collection*

	Exposure level	RCR	Method	Remarks
Inhalation	0,84 ppm	0,84	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,91	Used ECETOC TRA model.	

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities *Process sampling*

	Exposure level	RCR	Method	Remarks
Inhalation	0,63 ppm	0,63	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,7	Used ECETOC TRA model.	

PROC15: Use as laboratory reagent *Laboratory activities*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,73	Used ECETOC TRA model.	

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities *Bulk transfers, (open systems), (closed systems), With potential for aerosol generation.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,63 ppm	0,63	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,7	Used ECETOC TRA model.	

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities *Equipment cleaning and maintenance*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,84	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *Storage, With occasional controlled exposure.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,49	Used ECETOC TRA model.	

3.2. Environment:	*Used EUSES model. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.*

ERC1: Manufacture of substances

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	2,96 mg/L	0,969	Used EUSES model.	
Seawater	0,296 mg/L	0,969	Used EUSES model.	
Freshwater Sediment	2,39 mg/kg wwt	0,969	Used EUSES model.	

Saltwater Sediment	0,239 mg/kg wwt	0,969	Used EUSES model.	
Soil	0,06 mg/kg wwt	0,142	Used EUSES model.	
stp	29,4 mg/L	0,346	Used EUSES model.	

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	0,401 mg/L	0,006	Used EUSES model.	
Seawater	0,002 mg/L	0,006	Used EUSES model.	
Freshwater Sediment	0,016 mg/kg wwt	0,006	Used EUSES model.	
Saltwater Sediment	0,002 mg/kg wwt	0,006	Used EUSES model.	
Soil	0,418 mg/kg wwt	0,992	Used EUSES model.	
stp	0 mg/L	0	Used EUSES model.	

ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	3,05 mg/L	0,998	Used EUSES model.	
Seawater	0,305 mg/L	0,998	Used EUSES model.	
Freshwater Sediment	2,47 mg/kg wwt	0,998	Used EUSES model.	
Saltwater Sediment	0,247 mg/kg wwt	0,998	Used EUSES model.	
Soil	0,0584 mg/kg wwt	0,138	Used EUSES model.	
stp	30,3 mg/L	0,357	Used EUSES model.	

Section 4 Guidance to check compliance with the exposure scenario

4.1Health	*Confirm that RMMs and OCs are as described or of equivalent efficiency..*
4.2. Environment	*Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).ries-libraries.html).*

Scaling: The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$

mspERC: Substance use rate in spERC
EER,spERC: Efficacy of RMM in spERC
Frelease,,spERC: Initial release fraction in spERC
DFspERC: dilution factor of STP effluent in river
msite: Substance use rate at site
EER,site: Efficacy of RMM at site
Frelease,,site: Initial release fraction at site
DFsite: dilution factor of STP effluent in river

Exposure scenario II. Distribution of substance, Industrial use

Section 1: Exposure scenario

Sector(s) of Use	SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU9: Manufacture of fine chemicals

List of names of contributing worker scenarios and corresponding PROCs	PROC1. PROC2. PROC3. PROC4. PROC3. PROC15. PROC8b. PROC9. PROC8a. PROC2.

Name of contributing environmental scenario and corresponding ERC	ERC1 ERC2 ERC3 ERC4 ERC5 ERC6a ERC6b ERC6c ERC6d ERC7

Other process or activity:	Loading (including marine vessel/barge, rail/road car and IBC loading) and repacking (including drums and small packs) of substance, including its sampling, storage, unloading, distribution and associated laboratory activities.

Section 2: Control of Exposure

Physical form of the product:	liquid
Vapour pressure:	0,68 kPa
Process temperature:	25 °C
Remarks	not relevant

2.1. Control of Human Exposure

Other given operational conditions affecting workers exposure				
Area of use	**Room size:**	**Temperature:**	**Ventilation rate**	**Remarks**
Indoor/Outdoor use.	20 m3	25 °C		Liquid, vapour pressure 0,5 - 10 kPa at STP.

Frequency and duration of use	**Duration**	**Frequency of use:**	**Remarks**
Exposure time	8 h	5 days/week	

Name of contributing exposure scenario	Risk management measures (RMM)
General measures applicable to all activities:	Avoid direct skin or eye contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin or eye problems that may develop., Other protection measures such as impervious suits and face shields or goggles may be required during high dispersion activities which are likely to lead to substantial aerosol release.
General exposures (closed systems):	Handle substance within a closed system.
General exposures (closed systems), with sample collection, With occasional controlled exposure.:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.
General exposures (closed systems), Use in contained batch processes:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.Avoid carrying out activities involving exposure for more than 15 minutes.
General exposures (open systems), Batch process, with sample collection:	Ensure material transfers are under containment or extract ventilation.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 4 hours.
Process sampling:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Laboratory activities:	Handle in a fume cupboard or under extract ventilation.Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Bulk transfers, (closed systems), (open systems):	Clear transfer lines prior to de-coupling.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure material transfers are under containment or extract

	ventilation.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 1 hour.
Drum and small package filling:	Avoid carrying out activities involving exposure for more than 1 hour. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Equipment cleaning and maintenance:	Drain down and flush system prior to equipment break-in or maintenance.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.Avoid carrying out activities involving exposure for more than 15 minutes.
Storage, With occasional controlled exposure.:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Locate bulk storage outdoors., Store substance within a closed system.

2.2.Control of environmental exposure

Risk management measures (RMM)	Note: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Technical conditions and measures at process level (source) to prevent release	See chapter 8 of the safety data sheet (Environmental exposure controls).

Organisational measures to prevent/limit release from site:	none

Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	18.000 m3/d
Local freshwater dilution factor:	10
Local marine water dilution factor:	100

ERC1: Manufacture of substances ERC2: Formulation of preparations (mixtures) ERC3: Formulation in materials ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC6c: Industrial use of monomers for manufacture of thermoplastics ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers ERC7: Industrial use of substances in closed systems

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	235

Msafe	Annual amount per site: 7.050 kilotonnes/year

Frequency and duration of use: Continuous	300 days/year Continuous release.

process:					
Other given operational conditions affecting environmental exposure					
type	**Emission days (days/year):**	**Emission factors**			**Remarks**
		Air	**Soil**	**Water**	
Continuous release.	300	0,01 %	0 %	0,001 %	ESVOC spERC 1.1b.v1 Liquid, vapour pressure < 0,5 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %

Conditions and measures related to external treatment of waste for disposal		
Fraction of used amount transferred to external waste treatment:		
Suitable waste treatment	**Treatment effectiveness**	**Remarks**
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

Section 3. Exposure estimation

3.1. Health:	*When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.*

General measures applicable to all activities

none

PROC1: Use in closed process, no likelihood of exposure *General exposures (closed systems)*

	Exposure level	**RCR**	**Method**	**Remarks**
Inhalation	0,01 ppm	0,01	Used ECETOC TRA model.	
Dermal	0,34 mg/kg bw/day	0,34	Used ECETOC TRA model.	
Various Routes		0,35	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *General exposures (closed systems), with sample collection, With occasional controlled exposure.*

	Exposure level	**RCR**	**Method**	**Remarks**
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,84	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *General exposures (closed systems), Use in contained batch processes*

	Exposure level	**RCR**	**Method**	**Remarks**
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,38	Used ECETOC TRA model.	

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises *General exposures (open systems), Batch process, with sample collection*

	Exposure level	**RCR**	**Method**	**Remarks**
Inhalation	0,84 ppm	0,84	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	

Various Routes		0,91	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *Process sampling*

	Exposure level	RCR	Method	Remarks
Inhalation	0,88 ppm	0,88	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,91	Used ECETOC TRA model.	

PROC15: Use as laboratory reagent *Laboratory activities*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,73	Used ECETOC TRA model.	

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities *Bulk transfers, (closed systems), (open systems)*

	Exposure level	RCR	Method	Remarks
Inhalation	0,63 ppm	0,63	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,7	Used ECETOC TRA model.	

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) *Drum and small package filling*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,77	Used ECETOC TRA model.	

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities *Equipment cleaning and maintenance*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,84	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *Storage, With occasional controlled exposure.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,49	Used ECETOC TRA model.	

3.2. Environment:	*Used EUSES model. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.*

ERC1: Manufacture of substances ERC2: Formulation of preparations (mixtures) ERC3: Formulation in materials ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC6c: Industrial use of monomers for manufacture of thermoplastics ERC6d: Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers ERC7: Industrial use of substances in closed systems

Compartment	PEC	Risk characterisation ratio	Method	Remarks

		(PEC/PNEC):		
Water	2,99 mg/L	0,978	Used EUSES model.	
Seawater	0,299 mg/L	0,978	Used EUSES model.	
Freshwater Sediment	2,42 mg/kg wwt	0,978	Used EUSES model.	
Saltwater Sediment	0,242 mg/kg wwt	0,978	Used EUSES model.	
Soil	0,157 mg/kg wwt	0,372	Used EUSES model.	
stp	29,7 mg/L	0,35	Used EUSES model.	

Section 4 Guidance to check compliance with the exposure scenario

4.1Health	*Confirm that RMMs and OCs are as described or of equivalent efficiency..*
4.2. Environment	*Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).ries-libraries.html).*

Scaling: The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$

mspERC: Substance use rate in spERC
EER,spERC: Efficacy of RMM in spERC
Frelease,,spERC: Initial release fraction in spERC
DFspERC: dilution factor of STP effluent in river
msite: Substance use rate at site
EER,site: Efficacy of RMM at site
Frelease,,site: Initial release fraction at site
DFsite: dilution factor of STP effluent in river

Exposure scenario III. Formulation & (re)packing of substances and mixtures, Industrial use

Section 1: Exposure scenario

Sector(s) of Use	SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites SU10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

List of names of contributing worker scenarios and corresponding PROCs	PROC1. PROC2. PROC3. PROC4. PROC3. PROC15. PROC8b. PROC5. PROC8a. PROC8b. PROC14. PROC9. PROC8a. PROC2.

Name of contributing environmental scenario and corresponding ERC	ERC2

Other process or activity:	Formulation, packing and re-packing of the substance and its mixtures in batch or continuous operations, including storage, materials transfers, mixing, tabletting, compression, pelletisation, extrusion, large and small scale packing, sampling, maintenance and associated laboratory activities.

Section 2: Control of Exposure

Physical form of the product:	liquid
Vapour pressure:	0,68 kPa
Process temperature:	25 °C
Remarks	not relevant

2.1. Control of Human Exposure

Other given operational conditions affecting workers exposure				
Area of use	**Room size:**	**Temperature:**	**Ventilation rate**	**Remarks**
Indoor/Outdoor use.	20 m3	25 °C		Liquid, vapour pressure 0,5 - 10 kPa at STP.

Frequency and duration of use	**Duration**	**Frequency of use:**	**Remarks**
Exposure time	8 h	5 days/week	

Name of contributing exposure scenario	Risk management measures (RMM)
General measures applicable to all activities:	Avoid direct skin or eye contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin or eye problems that may develop., Other protection measures such as impervious suits and face shields or goggles may be required during high dispersion activities which are likely to lead to substantial aerosol release.
General exposures (closed systems):	Handle substance within a closed system.
General exposures (closed systems), with sample collection, With occasional controlled exposure.:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Sample via a closed loop or other system to avoid exposure.
General exposures (closed systems), Use in contained batch processes:	Handle substance within a closed system.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Sample via a closed loop or other system to avoid exposure.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
General exposures (open systems), Batch process, with sample collection, With potential for aerosol generation.:	Ensure material transfers are under containment or extract ventilation.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 4 hours.
Batch processes at elevated temperatures:	Avoid carrying out activities involving exposure for more than 1 hour. Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Provide extract ventilation to points where emissions occur.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Process sampling:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Laboratory activities:	Handle in a fume cupboard or under extract ventilation.Provide a good standard of general ventilation

	(not less than 3 to 5 air changes per hour).
Bulk transfers:	Clear transfer lines prior to de-coupling.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure material transfers are under containment or extract ventilation.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Avoid carrying out activities involving exposure for more than 1 hour.
Mixing operations (open systems), With potential for aerosol generation.:	Avoid carrying out activities involving exposure for more than 1 hour. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Manual, Transfer from/pouring from containers:	Avoid carrying out activities involving exposure for more than 1 hour. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Drum/batch transfers:	Avoid carrying out activities involving exposure for more than 4 hours. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Production of preparations or articles by tabletting, compression, extrusion, pelletisation:	Avoid carrying out activities involving exposure for more than 1 hour. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Drum and small package filling:	Avoid carrying out activities involving exposure for more than 1 hour. Provide extract ventilation to points where emissions occur.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).
Equipment cleaning and maintenance:	Drain down and flush system prior to equipment break-in or maintenance.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Ensure material transfers are under containment or extract ventilation.Avoid carrying out activities involving exposure for more than 15 minutes.
Storage, With occasional controlled exposure.:	Sample via a closed loop or other system to avoid exposure.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training.Ensure operation is undertaken outdoors., or, Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).Locate bulk storage outdoors., Store substance within a closed system.

2.2.Control of environmental exposure

Risk management measures (RMM)	Note: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Technical conditions and measures at process level (source) to prevent release	See chapter 8 of the safety data sheet (Environmental exposure controls).

Organisational measures to prevent/limit release from site:	none

Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	18.000 m3/d
Local freshwater dilution factor:	10

Local marine water dilution factor:	100

ERC2: Formulation of preparations (mixtures)

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	0,24

Msafe	Annual amount per site: 7.200 tonnes/yr

Frequency and duration of use: Continuous process:	300 days/year Continuous release.

Other given operational conditions affecting environmental exposure

type	Emission days (days/year):	Emission factors			Remarks
		Air	Soil	Water	
Continuous release.	300	2,5 %	0,01 %	0,5 %	ESVOC spERC 2.2.v1 Liquid, vapour pressure < 0,5 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d
Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %	

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

Section 3. Exposure estimation

3.1. Health:	*When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.*

General measures applicable to all activities

none

PROC1: Use in closed process, no likelihood of exposure *General exposures (closed systems)*

	Exposure level	RCR	Method	Remarks
Inhalation	0,01 ppm	0,01	Used ECETOC TRA model.	
Dermal	0,34 mg/kg bw/day	0,34	Used ECETOC TRA model.	
Various Routes		0,35	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *General exposures (closed systems), with sample collection, With occasional controlled exposure.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,5 ppm	0,5	Used ECETOC TRA model.	

Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,64	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *General exposures (closed systems), Use in contained batch processes*

	Exposure level	RCR	Method	Remarks
Inhalation	0,88 ppm	0,88	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,91	Used ECETOC TRA model.	

PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises *General exposures (open systems), Batch process, with sample collection, With potential for aerosol generation.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,84 ppm	0,84	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,91	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *Batch processes at elevated temperatures*

	Exposure level	RCR	Method	Remarks
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,38	Used ECETOC TRA model.	

PROC3: Use in closed batch process (synthesis or formulation) *Process sampling*

	Exposure level	RCR	Method	Remarks
Inhalation	0,88 ppm	0,88	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,91	Used ECETOC TRA model.	

PROC15: Use as laboratory reagent *Laboratory activities*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,73	Used ECETOC TRA model.	

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities *Bulk transfers*

	Exposure level	RCR	Method	Remarks
Inhalation	0,63 ppm	0,63	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,7	Used ECETOC TRA model.	

PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) *Mixing operations (open systems), With potential for aerosol generation.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,01 mg/kg bw/day	0,01	Used ECETOC TRA model.	
Various Routes		0,71	Used ECETOC TRA model.	

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities *Manual, Transfer from/pouring*

from containers

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,01 mg/kg bw/day	0,01	Used ECETOC TRA model.	
Various Routes		0,71	Used ECETOC TRA model.	

PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities *Drum/batch transfers*

	Exposure level	RCR	Method	Remarks
Inhalation	0,63 ppm	0,63	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,70	Used ECETOC TRA model.	

PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation *Production of preparations or articles by tabletting, compression, extrusion, pelletisation*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,01 mg/kg bw/day	0,01	Used ECETOC TRA model.	
Various Routes		0,71	Used ECETOC TRA model.	

PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) *Drum and small package filling*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,07 mg/kg bw/day	0,07	Used ECETOC TRA model.	
Various Routes		0,77	Used ECETOC TRA model.	

PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities *Equipment cleaning and maintenance*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,84	Used ECETOC TRA model.	

PROC2: Use in closed, continuous process with occasional controlled exposure *Storage, With occasional controlled exposure.*

	Exposure level	RCR	Method	Remarks
Inhalation	0,35 ppm	0,35	Used ECETOC TRA model.	
Dermal	0,14 mg/kg bw/day	0,14	Used ECETOC TRA model.	
Various Routes		0,49	Used ECETOC TRA model.	

3.2. Environment:	*Used EUSES model. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.*

ERC2: Formulation of preparations (mixtures)

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	3,05 mg/L	0,998	Used EUSES model.	
Seawater	0,305 mg/L	0,998	Used EUSES model.	
Freshwater Sediment	2,47 mg/kg wwt	0,998	Used EUSES model.	

Saltwater Sediment	0,247 mg/kg wwt	0,998	Used EUSES model.	
Soil	0,108 mg/kg wwt	0,257	Used EUSES model.	
stp	30,3 mg/L	0,357	Used EUSES model.	

Section 4 Guidance to check compliance with the exposure scenario

4.1Health	*Confirm that RMMs and OCs are as described or of equivalent efficiency..*
4.2. Environment	*Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).ries-libraries.html).*

Scaling: The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$

mspERC: Substance use rate in spERC
EER,spERC: Efficacy of RMM in spERC
Frelease,,spERC: Initial release fraction in spERC
DFspERC: dilution factor of STP effluent in river
msite: Substance use rate at site
EER,site: Efficacy of RMM at site
Frelease,,site: Initial release fraction at site
DFsite: dilution factor of STP effluent in river

Exposure scenario IV. Use of small quantities within laboratory settings within closed or contained systems, including incidental exposures during material transfers and equipment cleaning., Industrial use

Section 1: Exposure scenario

Sector(s) of Use	SU3: Industrial uses: Uses of substances as such or in preparations at industrial sites
List of names of contributing worker scenarios and corresponding PROCs	PROC15.
Name of contributing environmental scenario and corresponding ERC	ERC4
Other process or activity:	Use of the substance within laboratory settings, including material transfers and equipment cleaning.

Section 2: Control of Exposure

Physical form of the product:	liquid
Vapour pressure:	0,68 kPa
Process temperature:	25 °C
Remarks	not relevant

2.1. Control of Human Exposure

Other given operational conditions affecting workers exposure				
Area of use	**Room size:**	**Temperature:**	**Ventilation rate**	**Remarks**
Indoor/Outdoor use.	20 m3	25 °C		Liquid, vapour pressure 0,5 - 10 kPa at STP.

Frequency and duration of use	**Duration**	**Frequency of use:**	**Remarks**
Exposure time	8 h	5 days/week	

Name of contributing exposure scenario	Risk management measures (RMM)
General measures applicable to all activities:	Avoid direct skin or eye contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin or eye problems that may develop., Other protection measures such as impervious suits and face shields or goggles may be required during high dispersion activities which are likely to lead to substantial aerosol release.
Laboratory activities, small scale:	Handle in a fume cupboard or under extract ventilation. Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

2.2.Control of environmental exposure

Risk management measures (RMM)	Note: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.
Technical conditions and measures at process level (source) to prevent release	See chapter 8 of the safety data sheet (Environmental exposure controls).
Organisational measures to prevent/limit release from site:	none

Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	18.000 m3/d
Local freshwater dilution factor:	10

Local marine water dilution factor:	100

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	0,13

Msafe	Annual amount per site: 3.900 tonnes/yr

Frequency and duration of use: Continuous process:	300 days/year Continuous release.

Other given operational conditions affecting environmental exposure

type	Emission days (days/year):	Emission factors			Remarks
		Air	Soil	Water	
Continuous release.	300	2,5 %	0,01 %	2 %	ESVOC spERC 4.24v1 Liquid, vapour pressure 0,5 - 10 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

Section 3. Exposure estimation

3.1. Health:	*When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.*

General measures applicable to all activities

none

PROC15: Use as laboratory reagent *Laboratory activities, small scale*

	Exposure level	RCR	Method	Remarks
Inhalation	0,7 ppm	0,7	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,73	Used ECETOC TRA model.	

3.2. Environment:	*Used EUSES model. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.*

ERC4: Industrial use of processing aids in processes and products, not becoming part of articles

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	2,98 mg/L	0,974	Used EUSES model.	
Seawater	0,298 mg/L	0,974	Used EUSES model.	
Freshwater Sediment	2,4 mg/kg wwt	0,974	Used EUSES model.	
Saltwater Sediment	0,24 mg/kg wwt	0,974	Used EUSES model.	
Soil	0,068 mg/kg wwt	0,16	Used EUSES model.	
stp	29,6 mg/L	0,348	Used EUSES model.	

Section 4 Guidance to check compliance with the exposure scenario

4.1Health	*Confirm that RMMs and OCs are as described or of equivalent efficiency..*
4.2. Environment	*Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).ries-libraries.html).*

Scaling: The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$

mspERC: Substance use rate in spERC
EER,spERC: Efficacy of RMM in spERC
Frelease,,spERC: Initial release fraction in spERC
DFspERC: dilution factor of STP effluent in river
msite: Substance use rate at site
EER,site: Efficacy of RMM at site
Frelease,,site: Initial release fraction at site
DFsite: dilution factor of STP effluent in river

Exposure scenario V. Use of small quantities within laboratory settings within closed or contained systems, including incidental exposures during material transfers and equipment cleaning., Professional use

Section 1: Exposure scenario

Sector(s) of Use	SU22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)

List of names of contributing worker scenarios and corresponding PROCs	PROC15.

Name of contributing environmental scenario and corresponding ERC	ERC8a

Other process or activity:	Use of small quantities within laboratory settings, including material transfers and equipment cleaning.

Section 2: Control of Exposure

Physical form of the product:	liquid
Vapour pressure:	0,68 kPa
Process temperature:	25 °C
Remarks	not relevant

2.1. Control of Human Exposure

Other given operational conditions affecting workers exposure				
Area of use	**Room size:**	**Temperature:**	**Ventilation rate**	**Remarks**
Indoor/Outdoor use.	20 m3	25 °C		Liquid, vapour pressure 0,5 - 10 kPa at STP.

Frequency and duration of use	**Duration**	**Frequency of use:**	**Remarks**
Exposure time	8 h	5 days/week	

Name of contributing exposure scenario	Risk management measures (RMM)
General measures applicable to all activities:	Avoid direct skin or eye contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any contamination immediately. Provide basic employee training to prevent / minimise exposures and to report any skin or eye problems that may develop., Other protection measures such as impervious suits and face shields or goggles may be required during high dispersion activities which are likely to lead to substantial aerosol release.
Laboratory activities, small scale:	Handle in a fume cupboard or under extract ventilation. Provide a good standard of controlled ventilation (10 to 15 air changes per hour).

2.2.Control of environmental exposure

Risk management measures (RMM)	Note: Guidance is based on assumed operating conditions which may not be applicable to all sites; thus, scaling may be necessary to define appropriate site-specific risk management measures.

Technical conditions and measures at process level (source) to prevent release	See chapter 8 of the safety data sheet (Environmental exposure controls).

Organisational measures to prevent/limit release from site:	none

Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	18.000 m3/d
Local freshwater dilution factor:	10

Local marine water dilution factor:	100

ERC8a: Wide dispersive indoor use of processing aids in open systems

Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Air	No air emission controls required; required removal efficiency is 0%.
Soil	Soil emission controls are not applicable as there is no direct release to soil.
Water	If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.

Amounts used: Regional use tonnage (tons/year):	60.000 tonnes/yr
Amounts used: Fraction of regional tonnage used locally:	0,06

Msafe	Annual amount per site: 1.800 tonnes/yr

Frequency and duration of use: Continuous process:	365 days/year Continuous release.

Other given operational conditions affecting environmental exposure

type	Emission days (days/year):	Emission factors			Remarks
		Air	Soil	Water	
Continuous release.	300	50 %	0 %	50 %	ESVOC spERC 8.17.v1 Liquid, vapour pressure 0,5 - 10 kPa at STP.

Conditions and measures related to municipal sewage treatment plant	
municipal:	
Discharge rate:	2.000 m3/d

Total efficiency of removal from wastewater after onsite and offsite (domestic treatment plant) RMMs (%): 87,4 %

Conditions and measures related to external treatment of waste for disposal

Fraction of used amount transferred to external waste treatment:

Suitable waste treatment	Treatment effectiveness	Remarks
External treatment and disposal of waste should comply with applicable local and/or national regulations.		Prevent environmental discharge consistent with regulatory requirements.
Waste Recovery	External recovery and recycling of waste should comply with applicable local and/or national regulations.	

Section 3. Exposure estimation

3.1. Health:	*When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted DNELs and the resulting risk characterisation ratios are expected to be less than 1.*

General measures applicable to all activities

none

PROC15: Use as laboratory reagent *Laboratory activities, small scale*

	Exposure level	RCR	Method	Remarks
Inhalation	0,6 ppm	0,6	Used ECETOC TRA model.	
Dermal	0,03 mg/kg bw/day	0,03	Used ECETOC TRA model.	
Various Routes		0,63	Used ECETOC TRA model.	

3.2. Environment:	*Used EUSES model. When the recommended risk management measures (RMMs) and operational conditions (OCs) are observed, exposures are not expected to exceed the predicted PNECs and the resulting risk characterisation ratios are expected to be less than 1.*

ERC8a: Wide dispersive indoor use of processing aids in open systems

Compartment	PEC	Risk characterisation ratio (PEC/PNEC):	Method	Remarks
Water	3,04 mg/L	0,995	Used EUSES model.	
Seawater	0,304 mg/L	0,995	Used EUSES model.	
Freshwater Sediment	2,46 mg/kg wwt	0,995	Used EUSES model.	
Saltwater Sediment	0,246 mg/kg wwt	0,995	Used EUSES model.	
Soil	0,068 mg/kg wwt	0,163	Used EUSES model.	
stp	30,2 mg/L	0,356	Used EUSES model.	

Section 4 Guidance to check compliance with the exposure scenario

4.1Health	*Confirm that RMMs and OCs are as described or of equivalent efficiency..*
4.2. Environment	*Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html).ries-libraries.html).*

Scaling: The downstream user can check the compliance of his site by comparing site specific data with defaults used in the exposure assessment. The site specific quotient should be inferior or equal to the spERC quotient.

$$\frac{m_{spERC} * (1 - E_{ER,spERC}) * F_{release,spERC}}{DF_{spERC}} \geq \frac{m_{site} * (1 - E_{ER,site}) * F_{release,site}}{DF_{site}}$$

mspERC: Substance use rate in spERC
EER,spERC: Efficacy of RMM in spERC
Frelease,,spERC: Initial release fraction in spERC
DFspERC: dilution factor of STP effluent in river
msite: Substance use rate at site
EER,site: Efficacy of RMM at site
Frelease,,site: Initial release fraction at site
DFsite: dilution factor of STP effluent in river