ConnectingChemistry

BRENNTAG

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

FERRIC CHLORIDE 25 - 99%

Version 6.1 Print Date 2017/11/20

Revision date / valid from 2017/11/20 **MSDS code: MFIC010**

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

1.1. Product identifier

Trade name : FERRIC CHLORIDE 25 - 99%

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

Use of the Substance/Mixture : Identified use: See table in front of appendix for a complete overview of identified uses.

Uses advised against : At this moment we have not identified any uses advised against

Remarks : Before referring to any Exposure Scenario attached to this Safety Data Sheet please check the grade of the product: the Exposure Scenarios presented are not related to the product grade

1.3. Details of the supplier of the safety data sheet

Company : Brenntag UK Limited
Alpha House, Lawnswood Business Park
GB LS16 6QY Leeds

Telephone : +44 (0) 113 3879 200

Telefax : +44 (0) 113 3879 280

E-mail address : msds@brenntag.co.uk

1.4. Emergency telephone number

Emergency telephone number : Emergency only telephone number (open 24 hours): +44 (0) 1865 407333 (N.C.E.C. Culham)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

REGULATION (EC) No 1272/2008			
Hazard class	**Hazard category**	**Target Organs**	**Hazard statements**
Corrosive to metals	Category 1	---	H290

Acute toxicity (Oral)	Category 4	---	H302
Skin irritation	Category 2	---	H315
Serious eye damage	Category 1	---	H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

Most important adverse effects

Human Health : See section 11 for toxicological information.

Physical and chemical hazards : See section 9/10 for physicochemical information.

Potential environmental effects : See section 12 for environmental information.

2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008

Hazard symbols :

Signal word : Danger

Hazard statements :

H290	May be corrosive to metals.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.

Precautionary statements

Prevention :

P234	Keep only in original container.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response :

P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of water/soap.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.

Hazardous components which must be listed on the label:

• Iron trichloride

2.3. Other hazards

For Results of PBT and vPvB assessment see section 12.5.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Chemical nature : Aqueous solution

Hazardous components	Amount [%]	Classification (REGULATION (EC) No 1272/2008)	
		Hazard class / Hazard category	Hazard statements
Iron trichloride			
CAS-No. : 7705-08-0 EC-No. : 231-729-4 EU REACH-Reg. No. : 01-2119497998-05-xxxx	>= 25 - <= 99	Acute Tox.4 Skin Irrit.2 Eye Dam.1 Met. Corr.1	H302 H315 H318 H290

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice : Take off all contaminated clothing immediately.

If inhaled : Move to fresh air in case of accidental inhalation of vapours. If breathing is irregular or stopped, administer artificial respiration. If unconscious place in recovery position. Call a physician immediately.

In case of skin contact : After contact with skin, wash immediately with plenty of water. If symptoms occur, call a physician.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately. Go to an ophthalmic hospital if possible.

If swallowed : Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. If a person vomits when lying on his back, place him in the recovery position. Call a physician immediately.

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

Symptoms	: See Section 11 for more detailed information on health effects and symptoms.
Effects	: See Section 11 for more detailed information on health effects and symptoms.

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

Treatment	: Treat symptomatically.No further information available.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. The product itself does not burn.
Unsuitable extinguishing media	:	High volume water jet

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	Keep containers cool by spraying with water if exposed to fire, Heating will cause a pressure rise - with risk of bursting
Hazardous combustion products	:	Hydrogen chloride gas, Chlorine

5.3. Advice for firefighters

Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.Wear personal protective equipment.
Further advice	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Use personal protective equipment. Keep away unprotected persons. Ensure adequate ventilation. Avoid contact with skin and eyes. Do not breathe vapours or spray mist.

6.2. Environmental precautions

Environmental precautions	:	Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration.

6.3. Methods and materials for containment and cleaning up

Methods and materials for containment and cleaning up	:	Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders). Keep in suitable, closed containers for disposal.

Further information	:	Treat recovered material as described in the section "Disposal considerations".

6.4. Reference to other sections

See Section 1 for emergency contact information.
See Section 8 for information on personal protective equipment.
See Section 13 for waste treatment information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling	:	Keep container tightly closed. Ensure adequate ventilation. Avoid formation of aerosol. Use personal protective equipment. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Emergency eye wash fountains and emergency showers should be available in the immediate vicinity.
Hygiene measures	:	Keep away from food, drink and animal feedingstuffs. Smoking, eating and drinking should be prohibited in the application area. Wash hands before breaks and at the end of workday. Take off all contaminated clothing immediately.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Store in original container.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection. The product is not flammable.
Further information on storage conditions	:	Keep tightly closed in a dry and cool place. Keep in a well-ventilated place.
Advice on common storage	:	Keep away from food, drink and animal feedingstuffs.
Suitable packaging materials	:	Polyethylene
Unsuitable packaging materials	:	, Aluminium, copper, Nickel, Tin, iron

7.3. Specific end use(s)

Specific use(s)	:	Identified use: See table in front of appendix for a complete overview of identified uses.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Component:	Iron trichloride	CAS-No. 7705-08-0

Derived No Effect Level (DNEL)/Derived Minimal Effect Level (DMEL)

DNEL Workers, Long-term - systemic effects, Inhalation	:	2 mg/m3
DNEL Workers, Acute - systemic effects, Inhalation	:	2 mg/m3
DNEL Workers, Long-term - systemic effects, Skin contact	:	0.57 mg/kg bw/day
DNEL Workers, Acute - systemic effects, Skin contact	:	0.57 mg/kg bw/day
DNEL Consumers, Long-term - systemic effects, Inhalation	:	0.5 mg/m3
DNEL Consumers, Acute - systemic effects, Inhalation	:	0.5 mg/m3
DNEL Consumers, Long-term - systemic effects, Skin contact	:	0.29 mg/kg bw/day
DNEL Consumers, Acute - systemic effects, Skin contact	:	0.29 mg/kg bw/day
DNEL Consumers, Long-term - systemic effects, Ingestion	:	0.29 mg/kg bw/day

Predicted No Effect Concentration (PNEC)

Sewage treatment plant (STP) as Fe	:	500 mg/l
Fresh water sediment as Fe	:	49500 mg/kg dry weight (d.w.)
Marine sediment as Fe	:	49500 mg/kg dry weight (d.w.)
Soil as Fe	:	55500 mg/kg dry weight (d.w.)

Other Occupational Exposure Limit Values

UK. EH40 Workplace Exposure Limits (WELs), Short Term Exposure Limit (STEL):, as Fe
2 mg/m3

UK. EH40 Workplace Exposure Limits (WELs), Time Weighted Average (TWA):, as Fe
1 mg/m3

ELV (IE), Time Weighted Average (TWA):, as Fe
1 mg/m3

ELV (IE), Short Term Exposure Limit (STEL):, as Fe
2 mg/m3

8.2. Exposure controls

Appropriate engineering controls

Refer to protective measures listed in sections 7 and 8.

Personal protective equipment

Respiratory protection

Advice	:	In case of insufficient ventilation, wear suitable respiratory equipment. When aerosol or mist is formed use suitable respiratory protection. Respiratory protection complying with EN 141. Combination filter:B-P2 Combination filter:E-P2

Hand protection

Advice	:	Protective gloves complying with EN 374. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Protective gloves should be replaced at first signs of wear. The following information applies to aqueous, saturated solutions.
Material	:	Natural Rubber
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm
Material	:	polychloroprene
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm
Material	:	Nitrile rubber
Break through time	:	>= 8 h
Glove thickness	:	0.35 mm

Material	:	butyl-rubber
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Material	:	Fluorinated rubber
Break through time	:	>= 8 h
Glove thickness	:	0.4 mm

Material	:	Polyvinylchloride
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Eye protection

Advice : Safety goggles

Skin and body protection

Advice : Wear personal protective equipment.

Environmental exposure controls

General advice : Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form	:	liquid
Colour	:	brown
Odour	:	weak characteristic
Odour Threshold	:	no data available
pH	:	ca. 1
Melting point/freezing point	:	ca. -12 °C
Boiling point/boiling range	:	100 - 105 °C
Flash point	:	Not applicable
Evaporation rate	:	no data available

Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	Not applicable
Lower explosion limit	:	Not applicable
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Density	:	1.42 g/cm3 solution 40% 1.48 g/cm3 45% solution
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	log Kow -4 (24 °C) applies to anhydrous substance
Auto-ignition temperature	:	Not applicable
Thermal decomposition	:	315 °C Decomposes on heating.
Viscosity, dynamic	:	no data available
Explosivity	:	Product is not explosive.
Oxidizing properties	:	not oxidising

9.2. Other information

Corrosion to metals	:	Corrosive to metals

SECTION 10: Stability and reactivity

10.1. Reactivity

Advice : No decomposition if stored and applied as directed.

10.2. Chemical stability

Advice : Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions : Gives off hydrogen by reaction with metals. Reacts with alkalies. Reacts with reducing agents. Corrosive in contact with metals

10.4. Conditions to avoid

Conditions to avoid : Heat
Thermal decomposition : 315 °C
Decomposes on heating.

10.5. Incompatible materials

Materials to avoid : Strong bases, Acids, alkalis

10.6. Hazardous decomposition products

Hazardous decomposition products : hydrogen chloride, Chlorides

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Data for the product		
Acute toxicity		
Oral		
Acute toxicity estimate	:	505 - 2000 mg/kg) (Calculation method)
Inhalation		
		Not classified based on the calculation method according to CLP regulation.
Dermal		
		Not classified based on the calculation method according to CLP regulation.
Irritation		
Skin		
Result	:	Classified based on the calculation method according to CLP regulation.
Eyes		
Result	:	Classified based on the calculation method according to CLP regulation.
Sensitisation		
Result	:	Not classified based on the calculation method according to CLP regulation.
CMR effects		
CMR Properties		
Carcinogenicity	:	Not classified based on the calculation method according to CLP regulation.
Mutagenicity	:	Not classified based on the calculation method according to CLP regulation.
Teratogenicity	:	no data available

Reproductive toxicity	:	no data available

Specific Target Organ Toxicity

Single exposure

Remarks	:	Not classified based on the calculation method according to CLP regulation.

Repeated exposure

Remarks	:	Not classified based on the calculation method according to CLP regulation.

Other toxic properties

Repeated dose toxicity

no data available

Aspiration hazard

Not applicable,

Component:	**Iron trichloride**	**CAS-No. 7705-08-0**

Acute toxicity

Oral

LD50	:	1300 mg/kg (Mouse) Read-across (Analogy)

Inhalation

no data available

Dermal

LD50	:	> 2000 mg/kg (Rat) (OECD Test Guideline 402)

Irritation

Skin

Result	:	Irritating to skin. (Rat)

Eyes

Result	:	Irreversible damage. (Rabbit) (OECD Test Guideline 405)Read-across (Analogy)

Sensitisation

Result	:	not sensitizing (Local lymph node test; Mouse) (OECD Test Guideline 429)Read-across (Analogy)

CMR effects

Carcinogenicity

(negative, Rat, Fischer 344/DuCrj, male and female)(Oral)(OECD Test Guideline 451)

CMR Properties

Carcinogenicity	:	It is not considered carcinogenic.
Mutagenicity	:	In vitro tests did not show mutagenic effects
Teratogenicity	:	no data available
Reproductive toxicity	:	no data available

Genotoxicity in vitro

Result	:	negative (Chromosome aberration test in vitro; Chinese hamster fibroblasts; with and without metabolic activation) (OECD Test Guideline 487) negative (In vitro gene mutation study in mammalian cells; mouse lymphoma cells; with and without metabolic activation) (OECD Test Guideline 476) negative (reverse mutation assay; Salmonella typhimurium) (OECD Test Guideline 471)

Genotoxicity in vivo

Result	:	negative (Chromosome aberration test in vivo; Mouse)

Specific Target Organ Toxicity

Single exposure

Remarks	:	The substance or mixture is not classified as specific target organ toxicant, single exposure.

Repeated exposure

Remarks	:	The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Other toxic properties

Repeated dose toxicity

NOEL	:	277 mg/kg (Rat, male)(Oral; 90-day) (OECD Test Guideline 408)
NOEL	:	314 mg/kg (Rat, female)(Oral; 90-day) (OECD Test Guideline 408)

Aspiration hazard

No aspiration toxicity classification,

SECTION 12: Ecological information

12.1. Toxicity

Component:	**Iron trichloride**	**CAS-No. 7705-08-0**

Acute toxicity

Fish

LC50	:	20.3 mg/l (Lepomis macrochirus (Bluegill sunfish); 96 h)

Toxicity to daphnia and other aquatic invertebrates

EC50	:	9.6 mg/l (Daphnia magna (Water flea); 48 h) (Immobilization; OECD Test Guideline 202)

algae

ErC50	:	6.9 mg/l (Pseudokirchneriella subcapitata (green algae); 72 h) (OECD Test Guideline 201)
NOEC		2.4 mg/l (Pseudokirchneriella subcapitata (green algae); 72 h) (OECD Test Guideline 201)

Chronic toxicity

Fish

NOEC	:	0.32 mg/l (Pimephales promelas (fathead minnow); 33 d)

Aquatic invertebrates

NOEC		0.7 mg/l (Daphnia magna (Water flea); 21 d)

12.2. Persistence and degradability

Component:	Iron trichloride	CAS-No. 7705-08-0
Persistence and degradability		
Persistence		
Result	:	no data available
Biodegradability		
Result	:	The methods for determining the biological degradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Component:	Iron trichloride	CAS-No. 7705-08-0
Bioaccumulation		
Result	:	BCF: < 20 (Cyprinus carpio (Carp); 5 mg/l; Test substance: iron (II) sulfate heptahydrate) Bioaccumulation is not expected.

12.4. Mobility in soil

Component:	Iron trichloride	CAS-No. 7705-08-0
Mobility		
Soil	:	immobile

12.5. Results of PBT and vPvB assessment

Data for the product		
Results of PBT and vPvB assessment		
Result	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Component:	Iron trichloride	CAS-No. 7705-08-0
Results of PBT and vPvB assessment		
Result	:	This substance is not considered to be persistent, bioaccumulating nor toxic (PBT)., This substance is not considered to be very persistent and very bioaccumulating (vPvB).
Result	:	The PBT or vPvB criteria of Annex XIII to the REACH Regulation does not apply to inorganic substances.

12.6. Other adverse effects

Data for the product		
Additional ecological information		
Result	:	Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration.

Component:	Iron trichloride	CAS-No. 7705-08-0
Additional ecological information		
Result	:	Do not flush into surface water or sanitary sewer system. Harmful effects to aquatic organisms due to pH-shift. Avoid subsoil penetration.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product	:	Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services.
Contaminated packaging	:	Empty contaminated packagings thoroughly. They can be recycled after thorough and proper cleaning. If recycling is not practicable, dispose of in compliance with local regulations.
European Waste Catalogue Number	:	No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

SECTION 14: Transport information

14.1. UN number

2582

14.2. UN proper shipping name

ADR : FERRIC CHLORIDE SOLUTION
RID : FERRIC CHLORIDE SOLUTION
IMDG : FERRIC CHLORIDE SOLUTION

14.3. Transport hazard class(es)

ADR-Class	:	8
(Labels; Classification Code; Hazard identification No; Tunnel restriction code)		8; C1; 80; (E)
RID-Class	:	8

(Labels; Classification Code; Hazard identification No)		8; C1; 80
IMDG-Class	:	8
(Labels; EmS)		8; F-A, S-B

14.4. Packaging group

ADR	:	III
RID	:	III
IMDG	:	III

14.5. Environmental hazards

Environmentally hazardous according to ADR	:	no
Environmentally hazardous according to RID	:	no
Marine Pollutant according to IMDG-Code	:	no

14.6. Special precautions for user

Not applicable.

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

IMDG : Not applicable.

SECTION 15: Regulatory information

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

Data for the product

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC)	:	; The substance/mixture does not fall under this legislation.
EU. Directive 2012/18/EU (SEVESO III) Annex I	:	; The substance/mixture does not fall under this legislation.

Component: Iron trichloride CAS-No. 7705-08-0

EU. Regulation EU No. 649/2012 concerning the export and import of dangerous chemicals	:	; The substance/mixture does not fall under this legislation.
EU. REACH, Annex XVII, Marketing and Use	:	; The substance/mixture does not fall under this legislation.

Restrictions (Regulation 1907/2006/EC)

EU. Directive 2012/18/EU (SEVESO III) Annex I : ; The substance/mixture does not fall under this legislation.

UK. Releases to air and water (UK ISR) : Annual reporting level threshold: 10,000 kg

WGK (DE) : WGK 1: slightly water endangering: 515; Classification source is Annex 2.

Notification status
Iron trichloride:

Regulatory List	Notification	Notification number
AICS	YES	
DSL	YES	
EINECS	YES	231-729-4
ENCS (JP)	YES	(1)-213
IECSC	YES	
ISHL (JP)	YES	(1)-213
KECI (KR)	YES	KE-21134
NZIOC	YES	HSR004016
PICCS (PH)	YES	
TSCA	YES	

15.2. Chemical safety assessment

A Chemical Safety Assessment has been carried out for this substance.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H290	May be corrosive to metals.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.

Abbreviations and Acronyms

BCF	bioconcentration factor

BOD	biochemical oxygen demand
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packaging
CMR	carcinogenic, mutagenic or toxic to reproduction
COD	chemical oxygen demand
DNEL	derived no-effect level
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
LC50	median lethal concentration
LOAEC	lowest observed adverse effect concentration
LOAEL	lowest observed adverse effect level
LOEL	lowest observed effect level
NLP	no-longer polymer
NOAEC	no observed adverse effect concentration
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
OECD	Organisation for Economic Cooperation and Development
OEL	occupational exposure limit
PBT	persistent, bioaccumulative and toxic
PNEC	predicted no-effect concentration
STOT	specific target organ toxicity
SVHC	substance of very high concern
UVCB	substance of unknown or variable composition, complex reaction products or biological materials
vPvB	very persistent and very bioaccumulative

Further information

Key literature references and sources for data	:	Supplier information and data from the "Database of registered substances" of the European Chemicals Agency (ECHA) were used to create this safety data sheet.
Methods used for product classification	:	The classification for human health, physical and chemical hazards and environmental hazards were derived from a combination of calculation methods and if available test data.
Hints for trainings	:	The workers have to be trained regularly on the safe handling of the products based on the information provided in the Safety Data Sheet and the local conditions of the workplace. National regulations for the training of workers in the handling of hazardous materials must be adhered to.
Other information	:	The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with

regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship.

The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

|| Indicates updated section.

FERRIC CHLORIDE 25 - 99%

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance	3	8	NA	1, 2, 3, 8b	1	NA	ES950
2	Formulation & (re)packing of substances and mixtures	3	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 14, 15	2, 5	NA	ES952
3	Use in adhesives and sealants	3	NA	NA	5, 7, 8a, 8b, 9, 10, 12, 13, 14	5	NA	ES966
4	Use in adhesives and sealants	21	NA	1	NA	8c, 8f	4, 7, 8, 11, 13	ES978
5	Use in adhesives and sealants	22	NA	NA	8a, 8b, 9, 10, 11, 13, 19	8c, 8f	NA	ES972
6	Use in agrochemicals	21	NA	12, 27	NA	8a, 8d	NA	ES976
7	Use in agrochemicals	22	1	NA	1, 2, 8a, 8b, 11, 13	8a, 8d	NA	ES970
8	Use in laboratories	3	24	NA	15	4	NA	ES1500
9	Use in laboratories	22	24	NA	15	8e	NA	ES969
10	Use in process water treatment	3	NA	NA	2, 5, 8a, 8b	4	NA	ES954
11	Use in process water treatment	22	8, 10, 23, 24	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 15	8c, 8f	NA	ES7412
12	Use in sewage water treatment	3	NA	NA	2, 5, 8a, 8b	5	NA	ES956
13	Use as processing aid	3	8, 14	NA	2, 3, 4, 8b, 9, 15, 22, 26	4, 5, 6a, 6b	NA	ES960
14	Use in metal surface treatment.	3	10, 15, 16	NA	5, 7, 8a, 8b, 13	2, 6b	NA	ES962
15	Use in metal surface treatment.	21	NA	14	NA	8a, 8d	NA	ES974
16	Use in soil treatment	22	19	NA	2, 8a, 8b	8e	NA	ES11596
17	Use in gas treatment	3	NA	NA	2, 8a, 8b	2	NA	ES958

1. Short title of Exposure Scenario 1: Manufacture of substance		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)	
Process categories	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	
Environmental Release Categories	ERC1: Manufacture of substances	
2.1 Contributing scenario controlling environmental exposure for: ERC1		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	145000 ton(s)/year
	Daily amount per site	483.333 tonnes
Frequency and duration of use	Continuous exposure	300 days/year
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	0.15 %
	Emission or Release Factor: Soil	0 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Given the highly controlled conditions used in the manufacture of the substance to prevent the release of gases, it can be assumed that the release in any form to air is effectively zero
	Water	Wastewater release into municipal STP.
	Soil	Soil emission controls are not applicable as there is no direct release to soil.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	10,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
	Air emission controls are not appliable as there is no direct release to air.	
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of	liquid

	use)	
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palm of one hand (240cm2) (PROC1, PROC3)
	Exposed skin area	Palms of both hands (480 cm2) (PROC2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures(PROC1, PROC2, PROC3)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.(PROC1, PROC2, PROC3)	
	Wear chemically resistant gloves. (Efficiency: 90 %)(PROC1, PROC2, PROC3)	

2.3 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC8b)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). (Efficiency: 90 %)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

3. Exposure estimation and reference to its source

Environment

ERC1: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC1	---	Fresh water sediment	PEC	45g/kg	0.9091
ERC1	---	Soil	PEC	53g/kg	0.9636

Workers

PROC1, PROC2, PROC3, PROC8b: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC8b	---	Worker - inhalative, long-term - systemic	1.8mg/m³	0.39
PROC1, PROC2, PROC3, PROC8b	---	Worker - dermal, long-term - systemic	0.14mg/kg bw/day	0.11

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 2: Formulation & (re)packing of substances and mixtures		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC2: Formulation of preparations ERC5: Industrial use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC5		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	50 ton(s)/year
	Daily amount per site	166.67 kg
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	2 %
	Emission or Release Factor: Soil	0 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Disposal or recovery, Recovery of sludge for agriculture or horticulture
Conditions and measures related	Waste treatment	Waste water treatment may vary at different sites.

to external treatment of waste for disposal		Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palm of one hand (240cm2) (PROC1, PROC3)
	Exposed skin area	Palms of both hands (480 cm2) (PROC2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
2.3 Contributing scenario controlling worker exposure for: PROC4, PROC5, PROC9, PROC14, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Amount used	Amount per Day	420 kg
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC4, PROC5, PROC9, PROC14)
	Exposed skin area	Palm of one Hand 240 cm² (PROC15)
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
2.4 Contributing scenario controlling worker exposure for: PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in	Covers percentage substance in the product up to 100 %.

	Mixture/Article	
	Physical Form (at time of use)	solid
Amount used	Amount per Day	166.67 kg
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC8b)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). (Efficiency: 90 %)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

3. Exposure estimation and reference to its source

Environment

ERC2, ERC5: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2, ERC5	---	Soil	PEC	50.1g/kg	0.9109
ERC2, ERC5	---	Fresh water sediment	PEC	45g/kg	0.9091

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15	---	Worker - inhalative, long-term - systemic	1.8mg/m³	0.39
PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC14, PROC15	---	Worker - dermal, long-term - systemic	0.7mg/kg bw/day	0.54

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 3: Use in adhesives and sealants		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC12: Use of blowing agents in manufacture of foam PROC13: Treatment of articles by dipping and pouring PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletisation	
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC5		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	60 ton(s)/year
	Daily amount per site	200 kg
Frequency and duration of use	Continuous exposure	300 days/year
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	2 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC5, PROC8a, PROC8b, PROC9, PROC12, PROC14		
Product characteristics	Concentration of the Substance in	Covers percentage substance in the product up to 100 %.

	Mixture/Article	
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC5, PROC8b, PROC9, PROC14)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Exposed skin area	Palm of one Hand 240 cm² (PROC12)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures(except PROC14)	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. (Efficiency: 90 %)(except PROC14)	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)	
	Use suitable eye protection. Wear suitable protective clothing.	
2.3 Contributing scenario controlling worker exposure for: PROC7, PROC10, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
	Exposure duration	240 min(PROC7)
Human factors not influenced by risk management	Exposed skin area	Hands and forearms. 1500 cm² (PROC7)
	Exposed skin area	Two hands 960 cm² (PROC10)
	Exposed skin area	Palms of both hands (480 cm2) (PROC13)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use(PROC10, PROC13)	
	Indoor or outdoor use(PROC7)	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place(PROC10)	
	Carry out in a vented booth or extracted enclosure. Provide local exhaust ventilation (LEV).(Indoor PROC7)	
	Ensure containment of the emission source(Outdoor PROC7)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene	Wear chemically resistant gloves. (Efficiency: 90 %)	

and health evaluation	Use suitable eye protection. Wear suitable protective clothing.
	In case of inadequate ventilation wear respiratory protection. Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Indoor PROC7)
	or Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Outdoor PROC7)

3. Exposure estimation and reference to its source

Environment

ERC5: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC5	---	Soil	PEC	50g/kg	0.9091
ERC5	---	Fresh water sediment	PEC	45g/kg	0.9091

Workers

PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC12, PROC13, PROC14: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC5, PROC8a, PROC8b, PROC9, PROC12, PROC14	---	Worker - inhalative, long-term - systemic	2.2mg/m³	0.48
PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC12, PROC13, PROC14	---	Worker - dermal, long-term - systemic	0.3mg/kg bw/day	0.21
PROC7	---	Worker - inhalative, long-term	3.3mg/m³	0.72

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 4: Use in adhesives and sealants		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC1: Adhesives, sealants	
Article categories	AC4: Stone, plaster, cement, glass and ceramic articles AC7: Metal articles AC8: Paper articles AC11: Wood articles AC13: Plastic articles	
Environmental Release Categories	ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC8c, ERC8f		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 50%
Amount used	Annually total	900 tonnes
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	2 %
	Emission or Release Factor: Soil	0 %
2.2 Contributing scenario controlling consumer exposure for: PC1		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers concentrations up to 50%
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	365 days/year
Other given operational conditions affecting consumers exposure	Indoor use	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Avoid contact with skin. Avoid contact with eyes.

3. Exposure estimation and reference to its source

Environment

ERC8c, ERC8f: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8c, ERC8f	---	Fresh water sediment	PEC	45g/kg	0.9091

Consumers

PC1: ConsExpo 4.1

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PC1	---	Consumer - dermal, long-term - systemic	0.0008mg/kg bw/day	0.001

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see:
http://www.rivm.nl/en/healthanddisease/productsafety/ConsExpo.jsp
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

1. Short title of Exposure Scenario 5: Use in adhesives and sealants		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Process categories	PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC11: Non industrial spraying PROC13: Treatment of articles by dipping and pouring PROC19: Hand-mixing with intimate contact and only PPE available	
Environmental Release Categories	ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC8c, ERC8f		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Amount used	Annual amount per site	12.300 ton(s)/year
	Daily amount per site	41 kg
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	2 %
	Emission or Release Factor: Soil	0 %
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Collect all unused material for disposal as hazardous waste in compliance with local and national regulations
2.2 Contributing scenario controlling worker exposure for: PROC8a, PROC8b, PROC9, PROC19		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	

Human factors not influenced by risk management	Exposed skin area	Two hands 960 cm² (PROC8a)
	Exposed skin area	Palms of both hands (480 cm2) (PROC8b, PROC9)
	Exposed skin area	More than hands and forearms. 1980 cm² (PROC19)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
2.3 Contributing scenario controlling worker exposure for: PROC10, PROC11, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
	Exposure duration	240 min(PROC11)
	Frequency of use	3 days/week(PROC11)
Human factors not influenced by risk management	Exposed skin area	Two hands 960 cm² (PROC10)
	Exposed skin area	Hands and forearms. 1500 cm² (PROC11)
	Exposed skin area	Palms of both hands (480 cm2) (PROC13)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use(PROC10, PROC13)	
	Indoor or outdoor use(PROC11)	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Carry out in a vented booth or extracted enclosure. Provide local exhaust ventilation (LEV).(Indoor PROC11)	
	Ensure containment of the emission source(Outdoor PROC11)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Clean equipment and the work area every day.	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
	If no LEV or vented laminar spray booth available. Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Indoor PROC11)	
	or Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Outdoor PROC11)	

3. Exposure estimation and reference to its source

Environment

ERC8c, ERC8f: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8c, ERC8f	---	Soil	PEC	50g/kg	0.9091
ERC8c, ERC8f	---	Fresh water sediment	PEC	45g/kg	0.9091

Workers

PROC8a, PROC9, PROC10, PROC11, PROC13, PROC19: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC8a, PROC9, PROC19	---	Worker - inhalative, long-term - systemic	2.2mg/m³	0.48
PROC8a, PROC9, PROC10, PROC13, PROC19	---	Worker - dermal, long-term - systemic	0.27mg/kg bw/day	0.21
PROC11	---	Worker - inhalative, long-term	3.3mg/m³	0.72
PROC11	---	Worker - dermal, long-term - systemic	0.3mg/kg bw/day	0.21

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 6: Use in agrochemicals		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC12: Fertilizers PC27: Plant protection products	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 40 %
Frequency and duration of use	Continuous exposure	365 days/year
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	5 %
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
2.2 Contributing scenario controlling consumer exposure for: PC12, PC27		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 40 %
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	365 days/year
Other given operational conditions affecting consumers exposure	Indoor or outdoor use	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Wear suitable gloves. Avoid contact with skin. Avoid contact with eyes.

3. Exposure estimation and reference to its source

Environment

ERC8a, ERC8d: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8a, ERC8d	---	Fresh water sediment	PEC	45g/kg	0.9091

Consumers

PC12: StoffenManager (inhalation exposure)

PC12: ECETOC TRA worker V3

PC12, PC27: ConsExpo 4.1

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR

PC12, PC27	Indoor use	Consumer - inhalative, long-term - systemic	0.59mg/m³	0.54
PC12, PC27	solid, with gloves	Consumer - dermal, long-term - systemic	0.28mg/kg bw/day	0.4
PC12	liquid, without gloves	Consumer - dermal, long-term - systemic	0.14mg/kg bw/day	0.2
PC12	Indoor use	Inhalation	0.59mg/m³	0.54
PC12	Indoor use	Inhalation	1.1mg/m³	1

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see:
http://www.rivm.nl/en/healthanddisease/productsafety/ConsExpo.jsp
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

1. Short title of Exposure Scenario 7: Use in agrochemicals		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Sectors of end-use	SU1: Agriculture, forestry, fishery	
Process categories	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC11: Non industrial spraying PROC13: Treatment of articles by dipping and pouring	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	24 ton(s)/year
	Daily amount per site	200 kg
Frequency and duration of use	Continuous exposure	120 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Number of emission days per year	120
	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	5 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid

	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	120 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palm of one hand (240cm2) (PROC1)
	Exposed skin area	Palms of both hands (480 cm2) (PROC2, PROC8b)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place(except PROC1)	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. (Efficiency: 90 %)	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)(except PROC1)	
	Use suitable eye protection. Wear suitable protective clothing.	
2.3 Contributing scenario controlling worker exposure for: PROC11, PROC13		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	120 days/year(PROC13)
	Covers daily exposures up to 8 hours(PROC13)	
	Frequency of use	3 days/week(PROC11)
Human factors not influenced by risk management	Exposed skin area	Hands and forearms. 1500 cm² (PROC11)
	Exposed skin area	Palms of both hands (480 cm2) (PROC13)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Carry out in a vented booth or extracted enclosure. Provide local exhaust ventilation (LEV). Avoid carrying out operation for more than 4 hours.(Indoor PROC11)	
	Ensure containment of the emission source(Outdoor PROC11)	
Organisational measures to prevent /limit releases, dispersion and exposure	Clean equipment and the work area every day.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. (Efficiency: 90 %)	
	Use suitable eye protection. Wear suitable protective clothing.	
	If no LEV or vented laminar spray booth available. Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Indoor PROC11)	
	or Wear a full face respirator TM3 conforming to EN147 with type A filter or better (Efficiency: 95 %)(Outdoor PROC11)	

3. Exposure estimation and reference to its source

Environment

ERC8a, ERC8d: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8a, ERC8d	---	Soil	PEC	50g/kg	0.9091
ERC8a, ERC8d	---	Fresh water sediment	PEC	45g/kg	0.9091

Workers

PROC1, PROC2, PROC8a, PROC8b, PROC11, PROC13: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC8a, PROC8b, PROC11, PROC13	---	Worker - dermal, long-term - systemic	0.27mg/kg bw/day	0.21
PROC2, PROC8a, PROC8b	---	Worker - inhalative, long-term - systemic	2.2mg/m³	0.48
PROC11	---	Worker - inhalative, long-term	3.3mg/m³	0.48

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 8: Use in laboratories		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU24: Scientific research and development	
Process categories	PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles	
2.1 Contributing scenario controlling environmental exposure for: ERC4		
As no environmental hazard was identified no environmental related exposure assessment and risk characterization was performed		
2.2 Contributing scenario controlling worker exposure for: PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palm of one hand (240cm2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Clean equipment and the work area every day.	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. Wear suitable protective clothing.	
	Wear eye protection/ face protection. If no LEV: Wear respiratory protection Particle filter:P2	

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Workers

PROC15: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC15	---	Worker - inhalative, long-term - systemic	2.01mg/m³	0.43

PROC15	---	Worker - dermal, long-term - systemic	0.03mg/kg bw/day	0.02

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

For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 9: Use in laboratories		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Sectors of end-use	SU24: Scientific research and development	
Process categories	PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC8e: Wide dispersive outdoor use of reactive substances in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8e		
As no environmental hazard was identified no environmental related exposure assessment and risk characterization was performed		
2.2 Contributing scenario controlling worker exposure for: PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Amount used	Worker contact is generally very low as most operations are remotely controlled and sampling/analysis events are of short duration.	
Frequency and duration of use	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palm of one hand (240cm2)
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. (Efficiency: 90 %)	
	Wear a full face respirator conforming to EN136 with Type A/P2 filter or better. (Efficiency: 90 %)	
	Use suitable eye protection. Wear suitable protective clothing.	

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Workers

PROC15: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC15	---	Worker - inhalative, long-term	2.01mg/m³	0.43
PROC15	---	Worker - dermal, long-term - systemic	0.01mg/kg bw/day	0.01

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

For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 10: Use in process water treatment		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	
Environmental Release Categories	ERC4: Industrial use of processing aids in processes and products, not becoming part of articles	
2.1 Contributing scenario controlling environmental exposure for: ERC4		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	540 ton(s)/year
	Daily amount per site	1800 kg
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	1 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC5, PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid

Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC2, PROC8b)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place(PROC8a, PROC8b)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures(except PROC5)	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.(except PROC5)	
	Wear chemically resistant gloves. (Efficiency: 90 %)(except PROC5)	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)(PROC8a, PROC8b)	

2.3 Contributing scenario controlling worker exposure for: PROC5

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

3. Exposure estimation and reference to its source

Environment

ERC4: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4	---	Fresh water sediment	PEC	45g/kg	0.9091
ERC4	---	Soil	PEC	50g/kg	0.9091

Workers

PROC2, PROC5, PROC8a, PROC8b: ECETOC TRA worker V3

PROC5, PROC8a, PROC8b, PROC9, PROC15: MEASE

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2, PROC5, PROC8a, PROC8b	---	Worker - inhalative, long-term - systemic	2.01mg/m³	0.43
PROC2, PROC5, PROC8a, PROC8b	---	Worker - dermal, long-term - systemic	0.3mg/kg bw/day	0.23
PROC5, PROC8a, PROC8b, PROC9, PROC15	with gloves	Dermal worker exposure	< 0.69mg/kg	< 0.403

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 11: Use in process water treatment		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU 10: Formulation [mixing] of preparations and/ or re-packaging (excluding alloys) SU23: Recycling SU24: Scientific research and development	
Process categories	PROC1: Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent	
Environmental Release Categories	ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC8c, ERC8f		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	25
	Dilution Factor (Coastal Areas)	250
	Other data. Other information	Local freshwater dilution factor10 - 40
	Other data. Other information	Local marine water dilution factor100 - 400
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	It is required that the flow of release to municipal wastewater or to surface water do not cause significant in pH changes
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.

	Physical Form (at time of use)	Aqueous solution
Frequency and duration of use	Frequency of use	220 days/year
	Covers daily exposures up to 8 hours	
Other operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide adequate ventilation.	
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.	
Conditions and measures related to personal protection, hygiene and health evaluation	Chemically resistant gloves tested to EN374.(except PROC1, PROC2)	

3. Exposure estimation and reference to its source

Environment

Exposure is considered negligible.

Workers

PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15: MEASE

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC15	with gloves	Dermal worker exposure	< 0.69mg/kg bw/day	< 0.403

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

If measured data are not available, the DU may make use of an appropriate scaling tool such as MEASE (www.ebrc.de/mease.html) to estimate the associated exposure.
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 12: Use in sewage water treatment		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	
Environmental Release Categories	ERC5: Industrial use resulting in inclusion into or onto a matrix	
2.1 Contributing scenario controlling environmental exposure for: ERC5		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	73 ton(s)/year
	Daily amount per site	200 kg
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10 (ERC5)
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	1
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid

Frequency and duration of use	Frequency of use	365 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC2, PROC8b)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place(except PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)(PROC8b)	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

2.3 Contributing scenario controlling worker exposure for: PROC5

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	365 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

3. Exposure estimation and reference to its source

Environment

ERC5: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC5	---	Fresh water sediment	PEC	45g/kg	0.9091
ERC5	---	Soil	PEC	50.8g/kg	0.9236

Workers

PROC8a: ECETOC TRA worker V3

PROC8a, PROC8b: StoffenManager (inhalation exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC8a	---	Worker - dermal, long-term - systemic	0.3mg/kg bw/day	0.23
PROC8a, PROC8b	---	Inhalation	2.01mg/m³	0.43

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 13: Use as processing aid	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products) SU14: Manufacture of basic metals, including alloys
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as laboratory reagent PROC22: Manufacturing and processing of minerals and/or metals at substantially elevated temperature PROC26: Handling of solid inorganic substances at ambient temperature
Environmental Release Categories	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

2.1 Contributing scenario controlling environmental exposure for: ERC4, ERC5, ERC6a, ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	6000 ton(s)/year
	Daily amount per site	20 tonnes
Frequency and duration of use	Continuous exposure	300 days/year
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	0.5 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge

	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC3		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC2)
	Exposed skin area	Palm of one hand (240cm2) (PROC3)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. (Efficiency: 90 %)	
	Wear suitable protective clothing. Use suitable eye protection.	
2.3 Contributing scenario controlling worker exposure for: PROC4, PROC9, PROC15, PROC22, PROC26		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC4, PROC9)
	Exposed skin area	Palm of one hand (240cm2) (PROC15)
	Exposed skin area	More than hands and forearms. 1980 cm² (PROC22, PROC26)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
2.4 Contributing scenario controlling worker exposure for: PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.

	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC8b)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV). (Efficiency: 90 %)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	

3. Exposure estimation and reference to its source

Environment

ERC4, ERC5, ERC6a, ERC6b: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC4, ERC5, ERC6a, ERC6b	---	Soil	PEC	50.8g/kg	0.9236
ERC4, ERC5, ERC6a, ERC6b	---	Fresh water sediment	PEC	45g/kg	0.9091

Workers

PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15, PROC22, PROC26: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15, PROC22, PROC26	---	Worker - inhalative, long-term - systemic	1.8mg/m³	0.39
PROC2, PROC3, PROC4, PROC8b, PROC9, PROC15, PROC22, PROC26	---	Worker - dermal, long-term - systemic	0.7mg/kg bw/day	0.54

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default

values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented

Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 14: Use in metal surface treatment.	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Sectors of end-use	SU 10: Formulation [mixing] of preparations and/ or re-packaging (excluding alloys) SU15: Manufacture of fabricated metal products, except machinery and equipment SU16: Manufacture of computer, electronic and optical products, electrical equipment
Process categories	PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC13: Treatment of articles by dipping and pouring
Environmental Release Categories	ERC2: Formulation of preparations ERC6b: Industrial use of reactive processing aids

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC6b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	50.100 ton(s)/year
	Daily amount per site	167 kg
Frequency and duration of use	Continuous exposure	300 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	2 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.

2.2 Contributing scenario controlling worker exposure for: PROC5, PROC7, PROC13

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC5, PROC13)
	Exposed skin area	Palm of one hand (240cm2) (PROC7)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Spraying	Use product only in closed system.
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular cleaning of equipment and work area	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. Use suitable eye protection.	

2.3 Contributing scenario controlling worker exposure for: PROC8a, PROC8b

Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	300 days/year
	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Provide local exhaust ventilation (LEV).	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures Regular cleaning of equipment and work area	
Conditions and measures related to personal protection, hygiene and health evaluation	Wear chemically resistant gloves. Use suitable eye protection.	

3. Exposure estimation and reference to its source

Environment

ERC2, ERC6b: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2, ERC6b	---	Fresh water sediment	PEC	45g/kg	0.9091

ERC2, ERC6b	---	Soil	PEC	51.8g/kg	0.9418

Workers

PROC5, PROC7, PROC8a, PROC8b, PROC13: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC5, PROC7, PROC8a, PROC8b, PROC13	---	Worker - inhalative, long-term - systemic	1.8mg/m³	0.39
PROC5, PROC7, PROC8a, PROC8b, PROC13	---	Worker - dermal, long-term - systemic	0.14mg/kg bw/day	0.11

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 15: Use in metal surface treatment.		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC14: Metal surface treatment products, including galvanic and electroplating products	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8d		
No exposure assessment presented for the environment		
2.2 Contributing scenario controlling consumer exposure for: PC14		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 40 %
	Physical Form (at time of use)	liquid
Other given operational conditions affecting consumers exposure	Indoor or outdoor use	
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	Wear suitable gloves. Avoid contact with skin. Avoid contact with eyes.

3. Exposure estimation and reference to its source

Environment

No exposure assessment presented for the environment.

Consumers

PC14: ConsExpo 4.1

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PC14	---	Consumer - dermal, long-term - systemic	< 0.36mg/kg bw/day	< 0.86

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

For further information on the assessment method, see:
http://www.rivm.nl/en/healthanddisease/productsafety/ConsExpo.jsp
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

1. Short title of Exposure Scenario 16: Use in soil treatment		
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)	
Sectors of end-use	SU19: Building and construction work	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	
Environmental Release Categories	ERC8e: Wide dispersive outdoor use of reactive substances in open systems	
2.1 Contributing scenario controlling environmental exposure for: ERC8e		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	100 tonnes
Frequency and duration of use	Continuous exposure	100 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0
	Emission or Release Factor: Soil	20 %
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid, solid
Amount used	Amount per Day	400 kg/day
Frequency and duration of use	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Breathing volume	10 m3/day
	Body weight	70 kg
	Exposed skin surface	480 cm^2(PROC2, PROC8b)
	Exposed skin surface	960 cm^2(PROC8a)

Other operational conditions affecting workers exposure	Assumes use at not more than 20°C above ambient temperature.
Technical conditions and measures to control dispersion from source towards the worker	Ensure containment of the emission source Provide adequate ventilation.
Organisational measures to prevent /limit releases, dispersion and exposure	Ensure operatives are trained to minimise exposures.
Conditions and measures related to personal protection, hygiene and health evaluation	Safety glasses Use of gloves and working clothes have been considered additionally. In case of dust or aerosol formation: use respiratory protection with approved filter (P2)

3. Exposure estimation and reference to its source

Environment

ERC8e: EUSES 2.1

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC8e	---	Fresh water sediment	PEC	45g/kg	---
ERC8e	---	Agricultural soil	PEC	51.7g/kg	---

Workers

PROC8a: ECETOC TRA worker V3

PROC8a: StoffenManager (inhalation exposure)

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC8a	---	Worker - dermal, long-term - systemic	0.27mg/kg bw/day	0.21
PROC8a	---	Inhalation	2.01mg/m³	0.43

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Clean equipment and the work area every day.
Assumes a good basic standard of occupational hygiene is implemented.

1. Short title of Exposure Scenario 17: Use in gas treatment		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Process categories	PROC2: Use in closed, continuous process with occasional controlled exposure PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities	
Environmental Release Categories	ERC2: Formulation of preparations	
2.1 Contributing scenario controlling environmental exposure for: ERC2		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Amount used	Annual amount per site	2.409 ton(s)/year
	Daily amount per site	6.6 kg
Frequency and duration of use	Continuous exposure	365 days/year
Environment factors not influenced by risk management	Dilution Factor (River)	10
Other given operational conditions affecting environmental exposure	Emission or Release Factor: Air	0 %
	Emission or Release Factor: Water	1
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Air	Due to enclosed process air emissions are unlikely, except during transfer to and from the digester
	Water	Wastewater release into municipal STP.
Conditions and measures related to sewage treatment plant	Type of Sewage Treatment Plant	Municipal sewage treatment plant
	Flow rate of sewage treatment plant effluent	2,000 m3/d
	Sludge Treatment	Recovery of sludge for agriculture or horticulture
Conditions and measures related to external treatment of waste for disposal	Waste treatment	Waste water treatment may vary at different sites. Wastewater should be at least treated in either an on-site or a municipal secondary biological treatment plant prior to discharge
	Disposal methods	Can be landfilled or incinerated, when in compliance with local regulations.
2.2 Contributing scenario controlling worker exposure for: PROC2, PROC8a, PROC8b		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	365 days/year

	Covers daily exposures up to 8 hours	
Human factors not influenced by risk management	Exposed skin area	Palms of both hands (480 cm2) (PROC2, PROC8b)
	Exposed skin area	Two hands 960 cm² (PROC8a)
	Breathing volume	10 m3/day
	Body weight	70 kg
Other operational conditions affecting workers exposure	Indoor use	
	Assumes use at not more than 20°C above ambient temperature.	
Technical conditions and measures to control dispersion from source towards the worker	Ensure that a mechanical ventilation is in place(except PROC2)	
Organisational measures to prevent /limit releases, dispersion and exposure	Provide basic employee training to prevent/minimize exposures	
Conditions and measures related to personal protection, hygiene and health evaluation	Use suitable eye protection. Wear suitable protective clothing.	
	Wear chemically resistant gloves. (Efficiency: 90 %)	
	Wear a respirator conforming to EN140 with Type A/P2 filter or better. (Efficiency: 90 %)(except PROC2)	

3. Exposure estimation and reference to its source

Environment

ERC2: EUSES

Contributing Scenario	Specific conditions	Compartment	Value	Level of Exposure	RCR
ERC2	---	Fresh water sediment	PEC	45g/kg	0.9091
ERC2	---	Soil	PEC	50.1g/kg	0.9109

Workers

PROC2, PROC8a, PROC8b: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC2, PROC8a, PROC8b	---	Worker - inhalative, long-term - systemic	2.01mg/m³	0.43
PROC2, PROC8a, PROC8b	---	Worker - dermal, long-term - systemic	0.3mg/kg bw/day	0.23

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

The environmental emission has been evaluated using EUSES 2.1 (http://ihcp.jrc.ec.europa.eu), in which default values have been used, unless otherwise indicated.
For further information on the assessment method, see: http://www.ecetoc.org/tra
Where other risk management measures/operational conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.
Only properly trained persons shall make use of scaling methods while checking whether the OC and RMM are within the boundaries set by the ES

Additional good practice advice beyond the REACH Chemical Safety Assessment

Ensure that good work practices are implemented
Assumes a good basic standard of occupational hygiene is implemented.

Section 1: Identification of Substance/mixture and of the company undertaking

1.1: Product Identifier

Product Name AQUATREAT 2084

1.2: Relevant Identified use of substance/mixture and uses advised against

1.3: Details of the Supplier of the safety data sheet

Company Name: Aquatreat
Albany House
North Dock
Llanelli
Carmarthenshire
SA15 2LF

Telephone: 01554 775236
Fax: 01554 772253
E-mail: enquiries@aquatreat.co.uk
Website: www.aquatreat.co.uk

1.4: Emergency Telephone Numbers:

Emergency Telephone: 0333 333 9499

Section 2: Hazards Identification

2.1: Classification of substance/mixture according to Regulation (EC) No 1272/2008

Classification under CLP: NC Not Classified

Additional Information:

2.2: Label Elements: Labelling according to Regulation (EC) No 1272/2008 [CLP/GHS]

Label elements under CLP: NC Not Classified as Hazardous

Signal Words:

Hazard Pictograms:

Precautionary Statements

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

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

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

2.3: Other Hazards

Section 3: Composition information on hazardous ingredients

Hydrocarbons, C12 - C15, isoalkanes, cyclics <2% aromatics

EINECS	CAS No	Classification according to Regulation (EC) 1272:2008	Percent
920-107-4		H302; ASP Tox.1	20 - 45

Isotridecanol, ethoxylated

EINECS	CAS No	Classification according to Regulation (EC) 1272:2008	Percent
Polymer		H318;Eye Dam.1, H302; Acute Tox.4	<5

Section 4: First Aid Measures

4.1: Description of First Aid measures

Skin Contact: Wash off immediately with soap and plenty of water and remove any contaminated clothing. If persistent irritation occurs, seek medical advice

Eye Contact: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Alternatively, rinse immediately with Diphoterine. Get prompt medical attention

Ingestion: Rinse mounth with water. DO NOT induce vomiting. Seek medical attention immediately

Inhalation: Move to fresh air. No special first aid measures required.

4.2: Most important symptoms and effects both accute and delayed

Skin Contact: None under normal use

Eye Contact: None under normal use

Ingestion: None under normal use

Inhalation: None under normal use

4.3: Indication of any immediate medical treatment and special treatment required

None reasonably foerseeable.

Section 5: Fire fighting measures

5.1: Extinguishing media

Use fire extinguishers appropriate to the surrounding fire

Unsuitable Media

None

5.2: Special hazards arising from the substance/mixture

Oxides of Carbon and Nitrogen. Hydrogen cyanide may be produced as a result of combustion in an oxygen deficient atmosphere.

5.3: Advice for firefighters

Wear self contained breathing apparatus and protective clothing. Spills become extremely slippery when wet

Section 6: Accidental Release Measures

6.1: Personal precautions, protective equipment and emergency procedures

Wear appropriate PPE - See section 8

6.2: Environmental precautions

Do not allow spills to enter surface water drains and watercourses

6.3: Methods and Materials for containment and clean up

Soak up with inert material. Sweep and shovel into suitable closed conytainers and arrange disposal

6.4: References to other sections

Section 7.0: Handling and Storage

7.1: Precautions for safe handling

Avoid contact with skin and eyes.Renders surfaces extremely slippery when spilled. Do not eat, drink or smoke when using this product

7.2: Conditions for safe storage.

Keep away from heat and sources of ignition. Do not allow the product to freeze. Incompatible with oxidising agents

7.4: Specific End Use(s)

Section 8: Exposurecontrols/PersonalProtection

8.1: Control Parameters

None known

8 Hour TWA: **15MinSTEL:**

8.2: Exposure Controls

Engineering Measures	Use local exhaust ventilation if misting occurs
Respiratory Protection	respiratory protective equipment is not normally required unser normal conditions of use
Hand Protection	PVC or other plastic material gloves
Eye Protection	Safety glasses with side shields
Skin Protection	Coveralls or chemical apron

Section 9.0: Physical and ChemicalProperties

9.1: Information on basic physical and chemical properties

State:	Liquid
Colour:	Milky
Odour:	Aliphatic
Specific Gravity:	1.05
pH:	5 - 8 @5g/l

9.2: Other Information

Section 10: Stability and Reactivity

10.1: Reactivity

Stable under recommended conditions of storage and use

10.2: Chemical Stability

Stable under recommended conditions of storage and use

10.3: Possibility of Hazardous Reactions

None known

10.4: Conditions to Avoid

Heat, Sunlight and frost

10.5: Incompatible Materials

Oxidising Agents

10.6: Hazardous Decomposition Products

Oxides of Carbon and Nitrogen

Section 11: Toxicological Information

Aqautreat 2084

Dermal	Rat	LD50	>5000 mg/kg (estimated)

Aquatreat 2084

Oral	Rat	LD50	>5000 mg/kg (estimated)

Section 12: Ecological Information

12.1: Toxicity

LC50/Oncorhyncus myKiss/ 96hours>100mg/l (estimated), EC50/Daphnia Magna/48 hours>100mg/l (estimated), IC50/Algae/72 hours>100mg/l(estimated)

12.2: Persistence and Biodegradable

Not readily biodegradable

12.3: Bioaccumulative Potential

This product is not expected to bioaccumulate

12.4: Mobility in Soil

No data available

12.5: Results of PBT and vPvB Assessment

Not according to the criteria of Annex XIII of REACH

12.6: Other adverse effects

None

Section 13: Disposal Information

Dispose of waste in accordance with local or national regulations

Section 14: Transport Information

UN Number	
Shipping Name	Not classified as hazardous for transport
Transport Class	
Packing Group	
Environment Hazard	
Special Precautions	
Tunnel Code	
Transport Category	

Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Section 15: Regulatory Information

15.1: Safety, Health and Environmental regulations/legislation specific for the substance/mixture

15.2: Chemical safety assessment

Section 16: Other information

The above information is based on our present knowledge of the product at the time of publication. It is given in good faith, no warranty is implied as to the quality or specification of the product. Information contained in this data does not constitute an assessment of workplace risks. The user must satisfy himself that the product is entirely suitable for their purpose

A Member of The Linde Group

SAFETY DATA SHEET
Carbon dioxide

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

1.1 Product identifier

Product name: Carbon dioxide

Trade name: Carbon Dioxide Food Grade, R744, Laserpure, CP Grade

Other Name: Carbon Dioxide (Special Gases)

Additional identification

Chemical name:	Carbon dioxide
Chemical formula:	CO2
INDEX No.	-
CAS-No.	124-38-9
EC No.	204-696-9
REACH Registration No.	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.

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

Identified uses: Industrial and professional. Perform risk assessment prior to use. Aerosol propellant. Balance gas for mixtures. Beverage applications. Biocidal uses. Blanketing gas. Blast cleaning. Calibration gas. Carrier gas. Chemical synthesis. Combustion, melting and cutting processes. Cooling applications. Fire suppressant gas. Food freezing. Food packaging gas. Freezing, Cooling and heat transfer. Inerting gas. Inflation systems. Laboratory use. Laser gas. Plant growth promoter. Pressure head gas, operational assist gas in pressure systems. Process gas. Purge gas. Refrigerant. Solvent for extraction. Special effects (entertainment). Test gas.
Consumer use. Propellant gas. Shielding gas in gas welding.
It is the responsibility of the end user to ensure that the product as supplied is suitable for its intended use.

Uses advised against Industrial or technical grade is unsuitable for medical and/or food applications or inhalation.

1.3 Details of the supplier of the safety data sheet

Supplier

BOC
Priestley Road, Worsley
M28 2UT Manchester

Telephone: 0800 111 333

E-mail: ReachSDS@boc.com

1.4 Emergency telephone number: 0800 111 333

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 as amended.

Physical Hazards

Gases under pressure	Liquefied gas	H280: Contains gas under pressure; may explode if heated.

2.2 Label Elements

Signal Word: Warning

Hazard Statement(s): H280: Contains gas under pressure; may explode if heated.

Precautionary Statements

General None.

Prevention: None.

Response: None.

Storage: P403: Store in a well-ventilated place.

Disposal None.

Supplemental information

EIGA-As: Asphyxiant in high concentrations.

2.3 Other hazards

Contact with evaporating liquid may cause frostbite or freezing of skin.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name Carbon dioxide
INDEX No.: -
CAS-No.: 124-38-9
EC No.: 204-696-9
REACH Registration No.: Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.
Purity: 100%
The purity of the substance in this section is used for classification only, and does not represent the actual purity of the substance as supplied, for which other documentation should be consulted.
Trade name: Carbon Dioxide Food Grade, R744, Laserpure, CP Grade

Chemical name	Chemical formula	Concentration	CAS-No.	REACH Registration No.	M-Factor:	Notes
Carbon dioxide	CO2	100%	124-38-9	Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration.	-	#

The concentrations of the components in the SDS header, product name on page one and in section 3.2 are in mol due to regulatory requirements. All concentrations are nominal.
This substance has workplace exposure limit(s).
PBT: persistent, bioaccumulative and toxic substance.
vPvB: very persistent and very bioaccumulative substance.

SECTION 4: First Aid Measures

General: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

4.1 Description of first aid measures

Inhalation: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped. Low concentrations of CO2 cause increased respiration and headache.

Eye contact: Rinse the eye with water immediately. Remove contact lenses, if present and easy to do. Continue rinsing. Flush thoroughly with water for at least 15 minutes. Get immediate medical assistance. If medical assistance is not immediately available, flush an additional 15 minutes.

Skin Contact: Contact with evaporating liquid may cause frostbite or freezing of skin.

Ingestion: Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: Respiratory arrest. Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Treatment: Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention.

SECTION 5: Firefighting Measures

General Fire Hazards: Heat may cause the containers to explode.

5.1 Extinguishing media

Suitable extinguishing media: Material will not burn. In case of fire in the surroundings: use appropriate extinguishing agent.

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance or mixture: None.

Hazardous Combustion Products: None.

5.3 Advice for firefighters

Special fire fighting procedures: In case of fire: Stop leak if safe to do so. Continue water spray from protected position until container stays cool. Use extinguishants to contain the fire. Isolate the source of the fire or let it burn out.

Special protective equipment for firefighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Guideline: EN 469 Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 659 Protective gloves for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures: Evacuate area. Provide adequate ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.

6.2 Environmental Precautions: Prevent further leakage or spillage if safe to do so.

6.3 Methods and material for containment and cleaning up: Provide adequate ventilation.

6.4 Reference to other sections: Refer to sections 8 and 13.

SECTION 7: Handling and Storage:

7.1 Precautions for safe handling: Only experienced and properly instructed persons should handle gases under pressure. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Refer to supplier's handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Secure cylinders in an upright position at all times, close all valves when not in use. Provide adequate ventilation. Suck back of water into the container must be prevented. Do not allow backfeed into the container. Avoid suckback of water, acid and alkalis. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. When using do not eat, drink or smoke. Store in accordance with local/regional/national/international regulations. Never use direct flame or electrical heating devices to raise the pressure of a container. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Damaged valves should be reported immediately to the supplier Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to transfer gases from one container to another. Container valve guards or caps should be in place. Depressurisation of liquid CO2 below approximately 5 bar can create solid CO2 which may block protective devices, pipework and create dry-ice within containers. Containers, which contain or have contained flammable or explosive substances, must not be inerted with liquid carbon dioxide.

7.2 Conditions for safe storage, including any incompatibilities: Containers should not be stored in conditions likely to encourage corrosion. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible material.

7.3 Specific end use(s): None.

SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values	Source
Carbon dioxide	TWA	5,000 ppm 9,150 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	STEL	15,000 ppm 27,400 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	TWA	5,000 ppm 9,000 mg/m3	EU. Indicative Occupational Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)

8.2 Exposure controls

Appropriate engineering controls: Consider a work permit system e.g. for maintenance activities. Ensure adequate air ventilation. Oxygen detectors should be used when asphyxiating gases may be released. Provide adequate ventilation, including appropriate local extraction, to ensure that the defined occupational exposure limit is not exceeded. Systems under pressure should be regularly checked for leakages. Preferably use permanent leak tight connections (eg. welded pipes). Do not eat, drink or smoke when using the product. CO2 detectors should be used when CO2 may be released.

Individual protection measures, such as personal protective equipment

General information: A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Keep self contained breathing apparatus readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Eye/face protection: Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Guideline: EN 166 Personal Eye Protection.

Skin protection
Hand Protection: Guideline: EN 388 Protective gloves against mechanical risks.
Additional Information: Wear working gloves while handling containers

Body protection:	No special precautions.
Other:	Wear safety shoes while handling containers Guideline: ISO 20345 Personal protective equipment - Safety footwear.
Respiratory Protection:	When allowed by a risk assessment Respiratory Protective Equipment (RPE) may be used The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD. Self-contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmospheres. Guideline: EN 137 Respiratory protective devices - Self-contained open-circuit compressed air breathing apparatus with full face mask - Requirements, testing, marking.
Thermal hazards:	No precautionary measures are necessary.
Hygiene measures:	Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Do not eat, drink or smoke when using the product.
Environmental exposure controls:	For waste disposal, see section 13.

SECTION 9: Physical And Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	Gas
Form:	Liquefied gas
Colour:	Colourless
Odour:	Odourless
Odour Threshold:	Odour threshold is subjective and is inadequate to warn of over exposure.
pH:	3.2 - 3.7 The pH of saturated CO2 solutions varies from 3.7 at 101 kPa (1 atm) to 3.2 at 2370 kPa (23.4 atm)
Melting Point:	-56.6 °C
Boiling Point:	-78.5 °C
Sublimation Point:	-78.5 °C
Critical Temp. (°C):	31.0 °C
Flash Point:	Not applicable to gases and gas mixtures.
Evaporation Rate:	Not applicable to gases and gas mixtures.
Flammability (solid, gas):	This product is not flammable.
Flammability limit - upper (%):	Not applicable.
Flammability limit - lower(%):	Not applicable.
Vapour pressure:	45.1 bar (10 °C)
Vapour density (air=1):	1.522 (21 °C)

Relative density:	1.512 (-56.6 °C)
Solubility(ies)	
Solubility in Water:	2.900 mg/l (25 °C)
Partition coefficient (n-octanol/water):	0.83
Autoignition Temperature:	Not applicable.
Decomposition Temperature:	Not known.
Viscosity	
Kinematic viscosity:	No data available.
Dynamic viscosity:	0.07 mPa.s (20 °C)
Explosive properties:	Not applicable.
Oxidising Properties:	Not applicable.

9.2 Other information: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Molecular weight: 44.01 g/mol (CO_2)

SECTION 10: Stability and Reactivity

10.1 Reactivity: No reactivity hazard other than the effects described in sub-section below.

10.2 Chemical Stability: Stable under normal conditions.

10.3 Possibility of Hazardous Reactions: None.

10.4 Conditions to Avoid: None.

10.5 Incompatible Materials: No reaction with any common materials in dry or wet conditions.

10.6 Hazardous Decomposition Products: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological Information

General information: In high concentrations may cause rapid circulatory deterioration even at normal levels of oxygen concentration. Symptoms are headache, nausea and vomiting, which may lead to unconsciousness and even death.

11.1 Information on toxicological effects

Acute toxicity - Oral
Product: Based on available data, the classification criteria are not met.

Acute toxicity - Dermal
Product Based on available data, the classification criteria are not met.

Acute toxicity - Inhalation
Product Based on available data, the classification criteria are not met.

Skin Corrosion/Irritation
Product Based on available data, the classification criteria are not met.

Serious Eye Damage/Eye Irritation
Product Based on available data, the classification criteria are not met.

Respiratory or Skin Sensitisation
Product Based on available data, the classification criteria are not met.

Germ Cell Mutagenicity
Product Based on available data, the classification criteria are not met.

Carcinogenicity
Product Based on available data, the classification criteria are not met.

Reproductive toxicity
Product Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Single Exposure
Product Based on available data, the classification criteria are not met.

Specific Target Organ Toxicity - Repeated Exposure
Product Based on available data, the classification criteria are not met.

Aspiration Hazard
Product Not applicable to gases and gas mixtures..

SECTION 12: Ecological Information

12.1 Toxicity

Acute toxicity
Product No ecological damage caused by this product.

12.2 Persistence and Degradability
Product Not applicable to gases and gas mixtures..

12.3 Bioaccumulative Potential
Product The subject product is expected to biodegrade and is not expected to persist for long periods in an aquatic environment.

12.4 Mobility in Soil

Product: Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5 Results of PBT and vPvB assessment

Product: Not classified as PBT or vPvB.

12.6 Other Adverse Effects: No ecological damage caused by this product.

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

General information: Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place.

Disposal methods: Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Dispose of container via supplier only. Discharge, treatment, or disposal may be subject to national, state, or local laws.

European Waste Codes

Container: 16 05 05: Gases in pressure containers other than those mentioned in 16 05 04.

SECTION 14: Transport Information

ADR

14.1 UN Number:	UN 1013
14.2 UN Proper Shipping Name:	CARBON DIOXIDE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.2
Hazard No. (ADR):	20
Tunnel restriction code:	(C/E)
Emergency Action Code:	2T
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

RID

14.1 UN Number:	UN 1013
14.2 UN Proper Shipping Name	CARBON DIOXIDE
14.3 Transport Hazard Class(es)	
Class:	2
Label(s):	2.2
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IMDG

14.1 UN Number:	UN 1013
14.2 UN Proper Shipping Name:	CARBON DIOXIDE
14.3 Transport Hazard Class(es)	
Class:	2.2
Label(s):	2.2
EmS No.:	F-C, S-V
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–

IATA

14.1 UN Number:	UN 1013
14.2 Proper Shipping Name:	Carbon dioxide
14.3 Transport Hazard Class(es):	
Class:	2.2
Label(s):	2.2
14.4 Packing Group:	–
14.5 Environmental hazards:	Not applicable
14.6 Special precautions for user:	–
Other information	
Passenger and cargo aircraft:	Allowed.
Cargo aircraft only:	Allowed.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable

Additional identification: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Container valve guards or caps should be in place. Ensure adequate air ventilation.

SECTION 15: Regulatory information

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

EU Regulations

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, as amended.:
Not applicable

National Regulations

Management of Health and Safety at Work Regulations (1999 No. 3242). The Regulatory Reform (Fire Safety) Order 2005 (2005 No. 1541). Control of Substances Hazardous to Health Regulations (COSHH, 2002 No. 2677). Provision and Use of Work Equipment Regulations (PUWER, 1998 No. 2306). Personal Protective Equipment Regulations (1992 No. 2966). Control of Major Accident Hazards Regulations (COMAH, 2015 No. 483). Pressure Systems Safety Regulations (PSSR, 2000 No. 128). Only products that comply with the food regulations (EC) No. 1333/2008 and (EU) No. 231/2012 and are labelled as such may be used as food additives.
This Safety Data Sheet has been produced to comply with Regulation (EU) 2015/830.

15.2 Chemical safety assessment: Listed in Annex IV/V of Regulation (EC) No 1907/2006 (REACH), exempted from registration. A CSA does not need to be carried out for this product.

SECTION 16: Other Information

Revision Information: Not relevant.

Key literature references and sources for data:

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:
Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/).
European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.
European Chemical Agency: Information on Registered Substances http://apps.echa.europa.eu/registered/registered-sub.aspx#search
European Industrial Gases Association (EIGA) Doc. 169 "Classification and Labelling guide", as amended.
International Programme on Chemical Safety (http://www.inchem.org/)
ISO 10156:2010 Gases and gas mixtures - Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets.
Matheson Gas Data Book, 7th Edition.
National Institute for Standards and Technology (NIST) Standard Reference Database Number 69.
The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).
The European Chemical Industry Council (CEFIC) ERICards.
United States of America's National Library of Medicine's toxicology data network TOXNET (http://toxnet.nlm.nih.gov/index.html)
Threshold Limit Values (TLV) from the American Conference of Governmental Industrial Hygienists (ACGIH).
Substance specific information from suppliers.
Details given in this document are believed to be correct at the time of publication.
EH40 (as amended) Workplace exposure limits.

Wording of the H-statements in sections 2 and 3

H280	Contains gas under pressure; may explode if heated.

Training information:

Users of breathing apparatus must be trained. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the hazards.

Classification according to Regulation (EC) No 1272/2008 as amended.

Press. Gas Liq. Gas, H280

Other information:

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Ensure adequate air ventilation. Ensure all national/local regulations are observed. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Note: When the Product Name appears in the SDS header the decimal sign and its position comply with rules for the structure and drafting of international standards, and is a comma on the line. As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

Last revised date: 28.04.2021

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.

ConnectingChemistry

BRENNTAG

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

CAUSTIC SODA LIQUOR >=2% - <=50% (11-106 ºTW)

Version 9.0 Print Date 2017/07/13

Revision date / valid from 2017/07/13 **MSDS code: MCSS550**

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

1.1. Product identifier

Trade name	:	CAUSTIC SODA LIQUOR >=2% - <=50% (11-106 ºTW)
Substance name	:	sodium hydroxide
CAS-No.	:	1310-73-2
EC-No.	:	215-185-5
EU REACH-Reg. No.	:	01-2119457892-27-xxxx

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

Use of the Substance/Mixture	:	Identified use: See table in front of appendix for a complete overview of identified uses.
Uses advised against	:	At this moment we have not identified any uses advised against

1.3. Details of the supplier of the safety data sheet

Company	:	Brenntag UK Limited Alpha House, Lawnswood Business Park GB LS16 6QY Leeds
Telephone	:	+44 (0) 113 3879 200
Telefax	:	+44 (0) 113 3879 280
E-mail address	:	msds@brenntag.co.uk

1.4. Emergency telephone number

Emergency telephone number	:	Emergency only telephone number (open 24 hours): +44 (0) 1865 407333 (N.C.E.C. Culham)

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

REGULATION (EC) No 1272/2008			
Hazard class	**Hazard category**	**Target Organs**	**Hazard statements**
Corrosive to metals	Category 1	---	H290
Skin corrosion	Category 1A	---	H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

Most important adverse effects

Human Health	:	See section 11 for toxicological information.
Physical and chemical hazards	:	See section 9/10 for physicochemical information.
Potential environmental effects	:	See section 12 for environmental information.

2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008

Hazard symbols :

Signal word : Danger

Hazard statements :

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Precautionary statements

Prevention :

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

Response :

P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P390	Absorb spillage to prevent material damage.

Hazardous components which must be listed on the label:

- sodium hydroxide

2.3. Other hazards

For Results of PBT and vPvB assessment see section 12.5.

SECTION 3: Composition/information on ingredients

3.1. Substances

Chemical nature : Aqueous solution

Hazardous components	Amount [%]	Classification (REGULATION (EC) No 1272/2008)	
		Hazard class / Hazard category	Hazard statements
sodium hydroxide			
Index-No. : 011-002-00-6 CAS-No. : 1310-73-2 EC-No. : 215-185-5 EU REACH-Reg. No. : 01-2119457892-27-xxxx	>= 2 - <= 50	Met. Corr.1 Skin Corr.1A	H290 H314

For the full text of the H-Statements mentioned in this Section, see Section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

General advice : Take off all contaminated clothing immediately.

If inhaled : In case of accident by inhalation: remove casualty to fresh air and keep at rest. If breathing is irregular or stopped, administer artificial respiration. Call a physician immediately.

In case of skin contact : Wash off immediately with plenty of water. Call a physician immediately.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately. Go to an ophthalmic hospital if possible.

If swallowed : Rinse mouth with water. Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Call a physician immediately.

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

Symptoms : See Section 11 for more detailed information on health effects and symptoms.

Effects : Extremely corrosive and destructive to tissue. If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach. See Section

11 for more detailed information on health effects and symptoms.

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

Treatment : Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	High volume water jet

5.2. Special hazards arising from the substance or mixture

Specific hazards during firefighting	:	Incomplete combustion may form toxic pyrolysis products.
Hazardous combustion products	:	Carbon monoxide, Carbon dioxide (CO2), The formation of caustic fumes is possible.

5.3. Advice for firefighters

Special protective equipment for firefighters	:	In the event of fire, wear self-contained breathing apparatus.Wear appropriate body protection (full protective suit)
Specific extinguishing methods	:	Control smoke with water spray.
Further advice	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions : Keep away unprotected persons. Use personal protective equipment. Ensure adequate ventilation. Avoid contact with the skin and the eyes. Do not breathe vapours or spray mist.

6.2. Environmental precautions

Environmental precautions : Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. If the product contaminates rivers and lakes or drains inform respective authorities. If material reaches soil inform authorities responsible for such cases.

6.3. Methods and materials for containment and cleaning up

Methods and materials for containment and cleaning up : Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders). Keep in suitable, closed containers for disposal.

	:	Use mechanical handling equipment. Keep in suitable, closed containers for disposal.
Further information	:	Treat recovered material as described in the section "Disposal considerations".

6.4. Reference to other sections

See Section 1 for emergency contact information.
See Section 8 for information on personal protective equipment.
See Section 13 for waste treatment information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling	:	Keep container tightly closed. Ensure adequate ventilation. Use personal protective equipment. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Use respirator with appropriate filter if vapours or aerosol are released. Emergency eye wash fountains and emergency showers should be available in the immediate vicinity.
Hygiene measures	:	Keep away from food, drink and animal feedingstuffs. Smoking, eating and drinking should be prohibited in the application area. Wash hands before breaks and at the end of workday. Take off all contaminated clothing immediately.

7.2. Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers	:	Store in original container.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Further information on storage conditions	:	Keep tightly closed in a dry and cool place. Keep in a well-ventilated place.
Advice on common storage	:	Keep away from food, drink and animal feedingstuffs. Acids Light metals
Suitable packaging materials	:	Stainless steel, Polyethylene, Polypropylene, Polyvinylchloride
Unsuitable packaging materials	:	, Aluminium, Zinc, Copper

7.3. Specific end use(s)

Specific use(s)	:	No information available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Component:	sodium hydroxide	CAS-No. 1310-73-2

Derived No Effect Level (DNEL)/Derived Minimal Effect Level (DMEL)

DNEL
Workers, Long-term - local effects, Inhalation : 1.0 mg/m3

DNEL
Consumers, Long-term - local effects, Inhalation : 1.0 mg/m3

Predicted No Effect Concentration (PNEC)

No PNEC value was derived. :

Other Occupational Exposure Limit Values

UK. EH40 Workplace Exposure Limits (WELs), Short Term Exposure Limit (STEL):
2 mg/m3

ELV (IE), Short Term Exposure Limit (STEL):
2 mg/m3

8.2. Exposure controls

Appropriate engineering controls

Refer to protective measures listed in sections 7 and 8.

Provide sufficient air exchange and/or exhaust in work rooms.
Personal protective equipment

Respiratory protection

Advice : In case of brief exposure or low pollution use breathing filter apparatus.
Respiratory protection complying with EN 141.
In case of intensive or longer exposure use self-contained breathing apparatus.

Hand protection

Advice : Wear suitable gloves.
The glove material has to be impermeable and resistant to the product / the substance / the preparation.
Take note of the information given by the producer concerning

permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
Protective gloves should be replaced at first signs of wear.

Material	:	Natural Rubber
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Material	:	polychloroprene
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Material	:	Nitrile rubber
Break through time	:	>= 8 h
Glove thickness	:	0.35 mm

Material	:	butyl-rubber
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Material	:	Fluorinated rubber
Break through time	:	>= 8 h
Glove thickness	:	0.4 mm

Material	:	Polyvinylchloride
Break through time	:	>= 8 h
Glove thickness	:	0.5 mm

Eye protection

Advice : Safety goggles
Face-shield

Skin and body protection

Advice : Impervious clothing
Chemical resistant apron

Environmental exposure controls

General advice : Do not flush into surface water or sanitary sewer system.
Avoid subsoil penetration.
If the product contaminates rivers and lakes or drains inform respective authorities.
If material reaches soil inform authorities responsible for such cases.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Form	:	liquid
Colour	:	colourless
Odour	:	odourless
Odour Threshold	:	Not applicable
pH	:	ca. 14 (20 °C)
Melting point/range	:	-17 °C 10% solution 12 °C 50% solution
Boiling point/boiling range	:	105 °C 10% solution 145 °C 50% solution
Flash point	:	Not applicable
Evaporation rate	:	Not applicable
Flammability (solid, gas)	:	Not applicable
Upper explosion limit	:	Not applicable
Lower explosion limit	:	Not applicable
Vapour pressure	:	21 hPa (20 °C) 12% solution
Relative vapour density	:	no data available
Density	:	ca. 1.0538 g/cm3 (20 °C) 5% solution ca. 1.175 g/cm3 (20 °C) 15% solution ca. 1.274 g/cm3 (20 °C) 25% solution ca. 1.34 g/cm3 (20 °C) 30% solution ca. 1.38 g/cm3 (20 °C) 35% solution ca. 1.48 g/cm3 (20 °C) 45% solution ca. 1.525 g/cm3 (20 °C) 50% solution ca. 1.2191 g/cm3 (20 °C) 20% solution
Water solubility	:	1090 g/l (20 °C)
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition	:	no data available
Viscosity, dynamic	:	79 mPa.s (20 °C)
Explosivity	:	Product is not explosive.

Oxidizing properties	:	no data available

9.2. Other information

Corrosion to metals	:	Corrosive to metals

SECTION 10: Stability and reactivity

10.1. Reactivity

Advice	:	No decomposition if stored and applied as directed.

10.2. Chemical stability

Advice	:	Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions	:	Corrosive in contact with metals Gives off hydrogen by reaction with base metals (zinc, aluminium). Reacts exothermically with water. Reacts exothermic with acids.

10.4. Conditions to avoid

Conditions to avoid	:	Heat, flames and sparks.
Thermal decomposition	:	no data available

10.5. Incompatible materials

Materials to avoid	:	Materials to avoid: Acids, Light metals, Alcohols, Halogenated hydrocarbon

10.6. Hazardous decomposition products

Hazardous decomposition products	:	hydrogen

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Data for the product
Acute toxicity
Oral
Please find this information in the listing of the component/components below in this section.
Inhalation
no data available

Dermal

no data available

Irritation

Skin

Result : Causes severe skin burns and eye damage.

Eyes

Result : Causes eye burns.

Sensitisation

no data available

CMR effects

CMR Properties

Carcinogenicity : no data available

Mutagenicity : no data available

Reproductive toxicity : no data available

Specific Target Organ Toxicity

Single exposure

no data available

Repeated exposure

no data available

Other toxic properties

Repeated dose toxicity

no data available

Aspiration hazard

no data available

Component: sodium hydroxide CAS-No. 1310-73-2

Acute toxicity

Oral

No valid data available.

Inhalation

No valid data available.

Dermal

No valid data available.

Irritation

Skin

Result	:	Very corrosive (Rabbit) (No guideline followed)

Eyes

Result	:	Irritating to eyes. (Rabbit) (OECD Test Guideline 405)

Sensitisation

Result	:	not sensitizing (human) (No guideline followed)Patch test on human volunteers did not demonstrate sensitisation properties.

CMR effects

CMR Properties

Carcinogenicity	:	No experimental references for cancerogenity available.
Mutagenicity	:	In vitro tests did not show mutagenic effects In vivo tests did not show mutagenic effects
Teratogenicity	:	no data available
Reproductive toxicity	:	Not expected to impair fertility.

Specific Target Organ Toxicity

Single exposure

Remarks	:	The substance or mixture is not classified as specific target organ toxicant, single exposure.

Repeated exposure

Remarks	:	The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Other toxic properties
Aspiration hazard
Not applicable,

SECTION 12: Ecological information

12.1. Toxicity

Data for the product		
Acute toxicity		
Acute aquatic toxicity		
Result	:	The product is not classified as dangerous for the environment.

Component:	sodium hydroxide	CAS-No. 1310-73-2
Acute toxicity		
Fish		
LC50	:	125 mg/l (Gambusia affinis; 96 h) (No guideline followed)
LC50		145 mg/l (Poecilia reticulata; 24 h) (No guideline followed)
Toxicity to daphnia and other aquatic invertebrates		
EC50	:	40.4 mg/l (Ceriodaphnia (water flea); 48 h) (No guideline followed)
algae		
	:	no data available
Bacteria		
EC50	:	22 mg/l (Photobacterium phosphoreum; 15 min) (EPS 1/RM/24)

12.2. Persistence and degradability

Component:	sodium hydroxide	CAS-No. 1310-73-2

Persistence and degradability		
Persistence		
Result	:	no data available
Biodegradability		
Result	:	The methods for determining the biological degradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Component:	sodium hydroxide	CAS-No. 1310-73-2
Bioaccumulation		
Result	:	Does not bioaccumulate.

12.4. Mobility in soil

Component:	sodium hydroxide	CAS-No. 1310-73-2
Mobility		
Water	:	The product is mobile in water enviroment.

12.5. Results of PBT and vPvB assessment

Data for the product		
Results of PBT and vPvB assessment		
Result	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Component:	sodium hydroxide	CAS-No. 1310-73-2
Results of PBT and vPvB assessment		
Result	:	The PBT or vPvB criteria of Annex XIII to the REACH Regulation does not apply to inorganic substances.

12.6. Other adverse effects

Data for the product
Additional ecological information

Result	:	Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. Harmful effects to aquatic organisms due to pH-shift.
Result	:	

Component:	**sodium hydroxide**	**CAS-No. 1310-73-2**
	Additional ecological information	

Result	:	Harmful effects to aquatic organisms due to pH-shift. Neutralization is normally necessary before waste water is discharged into water treatment plants. Do not flush into surface water or sanitary sewer system.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product	:	Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services.
Contaminated packaging	:	Dispose of contaminated packaging in the same way as the product. In accordance with local and national regulations. Empty containers retain residue and can be dangerous.
European Waste Catalogue Number	:	No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

SECTION 14: Transport information

14.1. UN number

1824

14.2. UN proper shipping name

ADR	:	SODIUM HYDROXIDE SOLUTION
RID	:	SODIUM HYDROXIDE SOLUTION
IMDG	:	SODIUM HYDROXIDE SOLUTION

14.3. Transport hazard class(es)

ADR-Class (Labels; Classification Code; Hazard identification No; Tunnel restriction code)	:	8 8; C5; 80; (E)
RID-Class (Labels; Classification Code; Hazard identification No)	:	8 8; C5; 80
IMDG-Class	:	8

(Labels; EmS) 8; F-A, S-B

14.4. Packaging group

ADR : II
RID : II
IMDG : II

14.5. Environmental hazards

Environmentally hazardous according to ADR : no
Environmentally hazardous according to RID : no
Marine Pollutant according to IMDG-Code : no

14.6. Special precautions for user

Not applicable.

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

IMDG : Not applicable.

SECTION 15: Regulatory information

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

Data for the product

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC) : Point Nos.: , 3; Listed

EU. Directive 2012/18/EU (SEVESO III) Annex I : ; The substance/mixture does not fall under this legislation.

Component: sodium hydroxide CAS-No. 1310-73-2

EU. Regulation EU No. 649/2012 concerning the export and import of dangerous chemicals : ; The substance/mixture does not fall under this legislation.

EU. REACH, Annex XVII, Marketing and Use Restrictions (Regulation 1907/2006/EC) : ; The substance/mixture does not fall under this legislation.

EU. Regulation No 1451/2007 [Biocides], Annex I, OJ (L 325)	:	EC Number: , 215-185-5; Listed
EU. Regulation No. 1223/2009 on cosmetic products, Annex III: List of Restricted Substances in Cosmetic Products	:	Maximum concentration in ready for use preparation: 2 %; Hair straightener: General use; See the text of the regulation for applicable exceptions or provisions. pH < 12,7.; pH adjuster for depilatories; See the text of the regulation for applicable exceptions or provisions. Maximum concentration in ready for use preparation: 4.5 %; Hair straightener: Professional use; See the text of the regulation for applicable exceptions or provisions. pH < 11.; Uses as pH adjuster other than for depilatories; See the text of the regulation for applicable exceptions or provisions. Maximum concentration in ready for use preparation: 5 %; Nail cuticle solvent; See the text of the regulation for applicable exceptions or provisions.
EU. Directive 2012/18/EU (SEVESO III) Annex I	:	; The substance/mixture does not fall under this legislation.
WGK (DE)	:	WGK 1: slightly water endangering: 142; Classification source is Annex 2.

Component:	**sodium hypochlorite, solution**	**CAS-No. 7681-52-9**

Notification status
sodium hypochlorite, solution:

Regulatory List	Notification	Notification number
AICS	YES	
DSL	YES	
EINECS	YES	231-668-3
ENCS (JP)	YES	(1)-237
IECSC	YES	
ISHL (JP)	YES	(1)-237
KECI (KR)	YES	KE-31506
NZIOC	YES	HSR003698
PICCS (PH)	YES	
TSCA	YES	

15.2. Chemical safety assessment

no data available

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

Abbreviations and Acronyms

BCF	bioconcentration factor
BOD	biochemical oxygen demand
CAS	Chemical Abstracts Service
CLP	Classification, Labelling and Packaging
CMR	carcinogenic, mutagenic or toxic to reproduction
COD	chemical oxygen demand
DNEL	derived no-effect level
EINECS	European Inventory of Existing Commercial Chemical Substances
ELINCS	European List of Notified Chemical Substances
GHS	Globally Harmonized System of Classification and Labelling of Chemicals
LC50	median lethal concentration
LOAEC	lowest observed adverse effect concentration
LOAEL	lowest observed adverse effect level
LOEL	lowest observed effect level
NLP	no-longer polymer
NOAEC	no observed adverse effect concentration
NOAEL	no observed adverse effect level
NOEC	no observed effect concentration
NOEL	no observed effect level
OECD	Organisation for Economic Cooperation and Development
OEL	occupational exposure limit
PBT	persistent, bioaccumulative and toxic
PNEC	predicted no-effect concentration
STOT	specific target organ toxicity
SVHC	substance of very high concern
UVCB	substance of unknown or variable composition, complex reaction products or biological materials
vPvB	very persistent and very bioaccumulative

Further information

Key literature references and sources for data	:	Supplier information and data from the "Database of registered substances" of the European Chemicals Agency (ECHA) were

used to create this safety data sheet.

Methods used for product classification	:	The classification for human health, physical and chemical hazards and environmental hazards were derived from a combination of calculation methods and if available test data.
Hints for trainings	:	The workers have to be trained regularly on the safe handling of the products based on the information provided in the Safety Data Sheet and the local conditions of the workplace. National regulations for the training of workers in the handling of hazardous materials must be adhered to.
Other information	:	The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship. The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

|| Indicates updated section.

CAUSTIC SODA LIQUOR >=2% - <=50% (11-106 ºTW)

No.	Short title	Main User Group (SU)	Sector of Use (SU)	Product Category (PC)	Process Category (PROC)	Environmental Release Category (ERC)	Article Category (AC)	Specified
1	Manufacture of substance - liquid	3	8	NA	1, 2, 3, 4, 8a, 8b, 9	1	NA	ES035
2	Manufacture of substance - solid	3	8	NA	1, 2, 3, 4, 8a, 8b, 9	1	NA	ES057
3	Industrial use	3	NA	NA	1, 2, 3, 4, 5, 7, 8a, 8b, 9, 10, 13, 15, 19, 23, 24	2, 4, 6a, 6b, 7	NA	ES065
4	Professional use	22	NA	NA	1, 2, 3, 4, 5, 8a, 8b, 9, 10, 11, 13, 15, 19, 23, 24	8a, 8b, 8d, 9a	NA	ES067
5	Consumer use	21	NA	20, 35, 39	NA	8a, 8b, 8d, 9a	NA	ES075

CAUSTIC SODA LIQUOR >=2% - <=50% (11-106 ºTW)

1. Short title of Exposure Scenario 1: Manufacture of substance - liquid		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Environmental Release Categories	ERC1: Manufacture of substances	

2.1 Contributing scenario controlling environmental exposure for: ERC1		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product : 0% - 50%
Other given operational conditions affecting environmental exposure	Continuous exposure	
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Application Area	Industrial use
	Water	Regular control of the pH value during introduction into open waters is required.,In general discharges should be carried out such that pH changes in receiving surface waters are minimised.,In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.,Risk management measures related to the environment aim to avoid discharging the substance into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes.
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9		
Product characteristics	Concentration of the Substance in Mixture/Article	Concentration of substance in product : 0% - 50%
	Physical Form (at time of use)	liquid
Frequency and duration of use	Frequency of use	200 days/year
	Frequency of use	8 hours/day
Technical conditions and measures to control dispersion from source towards the worker	Application Area	Industrial use
	Use closed systems or covering of open containers (e.g. screens) Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) Use of pliers, grip arms with long handles with manual use to avoid direct	

	contact and exposure by splashes (no working over one's head)
Organisational measures to prevent /limit releases, dispersion and exposure	Application Area: Industrial use Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects and c) to follow the safety procedures instructed by the employer. The employer has also to ascertain that the required PPE is available
Conditions and measures related to personal protection, hygiene and health evaluation	Application Area: Industrial use In case of dust or aerosol formation: use respiratory protection with approved filter (P2) Wear chemically resistant gloves. material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: >480 min material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min wear tightly fitting safety goggles, face–shield Wear suitable protective clothing, aprons, shield and suits If splashes are likely to occur: Rubber or plastic boots

3. Exposure estimation and reference to its source

Environment

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, as the toxicity of the metal ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicates that the substance will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is no exposure to the receiving surface water. The sediment compartment is not considered, because it is not relevant for the substance. If emitted to the aquatic compartment, sorption to sediment particles will be negligible. Significant emissions to air are not expected due to the very low vapour pressure of the substance. If emitted to air as a water-based aerosol, the substance will be rapidly neutralised as a result of its reaction with CO2 (or acids). Significant emissions to the terrestrial environment are not expected. The sludge application route is not relevant for the emission to agricultural soil, as no sorption of the substance to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH- will be neutralised in the soil pore water or the pH may increase. Bioaccumulation will not occur.

Workers

PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9	Modeled exposure data, very low vapour pressure, Without Local Exhaust Ventilation, without respiratory protection	Inhalation worker exposure	0.17mg/m³	0.17
PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9	Measured exposure data, worst-case	Worker - inhalative, short-term - local	0.33mg/m³	0.33
PROC1, PROC2, PROC3, PROC4,	Measured exposure data, worst-case	Worker - inhalative, long-term - local	0.14mg/m³	0.14

PROC8a, PROC8b, PROC9				

This substance is corrosive. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Dermal exposure to the substance was not quantified. The substance is not expected to be systemically available in the body under normal handling and use conditions. Systemic effects of NaOH after dermal or inhalation exposure are not expected to occur.

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below
If measured data are not available, the DU may make use of an appropriate scaling tool such as ECETOC TRA.
Important note: By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).

Additional good practice advice beyond the REACH Chemical Safety Assessment

Local exhaust ventilation is not required but good practice.
General ventilation is good practice unless local exhaust ventilation

1. Short title of Exposure Scenario 2: Manufacture of substance - solid		
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites	
Sectors of end-use	SU8: Manufacture of bulk, large scale chemicals (including petroleum products)	
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	
Environmental Release Categories	ERC1: Manufacture of substances	
2.1 Contributing scenario controlling environmental exposure for: ERC1		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Other given operational conditions affecting environmental exposure	Continuous exposure	
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Application Area	Industrial use
	Water	Regular control of the pH value during introduction into open waters is required.,In general discharges should be carried out such that pH changes in receiving surface waters are minimised.,In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.,Risk management measures related to the environment aim to avoid discharging the substance into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes.
2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC8a, PROC8b, PROC9		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	solid
Frequency and duration of use	Frequency of use	200 days/year
	Frequency of use	8 hours/day
Technical conditions and measures to control dispersion from source towards the worker	Application Area	Industrial use
	Use closed systems or covering of open containers (e.g. screens) Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) Use of pliers, grip arms with long handles with manual use to avoid direct contact and exposure by splashes (no working over one's head)	
Organisational measures to prevent /limit releases, dispersion	Application Area	Industrial use
	Replacing, where appropriated, manual processes by automated and/or closed	

and exposure	processes. This would avoid irritating mists, sprayings and subsequent potential splashes. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects and c) to follow the safety procedures instructed by the employer. The employer has also to ascertain that the required PPE is available
Conditions and measures related to personal protection, hygiene and health evaluation	Application Area: Industrial use In case of dust or aerosol formation: use respiratory protection with approved filter (P2) Wear chemically resistant gloves. material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: >480 min material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min wear tightly fitting safety goggles, face–shield Wear suitable protective clothing, aprons, shield and suits If splashes are likely to occur: Rubber or plastic boots

3. Exposure estimation and reference to its source

Environment

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, as the toxicity of the metal ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicates that the substance will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is no exposure to the receiving surface water. The sediment compartment is not considered, because it is not relevant for the substance. If emitted to the aquatic compartment, sorption to sediment particles will be negligible. Significant emissions to air are not expected due to the very low vapour pressure of the substance. If emitted to air as a water-based aerosol, the substance will be rapidly neutralised as a result of its reaction with CO2 (or acids). Significant emissions to the terrestrial environment are not expected. The sludge application route is not relevant for the emission to agricultural soil, as no sorption of the substance to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH- will be neutralised in the soil pore water or the pH may increase. Bioaccumulation will not occur.

Workers

PROC1, PROC2, PROC3, PROC4, PROC8a, PROC9: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2	Modeled exposure data, Low dustiness, no LEV, no respiratory protection (RPE)	Inhalation worker exposure	0.01mg/m³	0.01
PROC3, PROC9	Modeled exposure data, Low dustiness, no LEV, no respiratory protection (RPE)	Inhalation worker exposure	0.1mg/m³	0.1
PROC4, PROC8a	Modeled exposure data, Low dustiness, no LEV, no respiratory protection (RPE)	Inhalation worker exposure	0.5mg/m³	0.5
PROC9	Measured exposure data, worst-case	Worker - inhalative, short-term - local	0.26mg/m³	0.26

This substance is corrosive. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Dermal exposure

to the substance was not quantified. The substance is not expected to be systemically available in the body under normal handling and use conditions. Systemic effects of NaOH after dermal or inhalation exposure are not expected to occur.

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below
If measured data are not available, the DU may make use of an appropriate scaling tool such as ECETOC TRA.
Important note: By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).

Additional good practice advice beyond the REACH Chemical Safety Assessment

Local exhaust ventilation is not required but good practice.
General ventilation is good practice unless local exhaust ventilation

1. Short title of Exposure Scenario 3: Industrial use	
Main User Groups	SU 3: Industrial uses: Uses of substances as such or in preparations at industrial sites
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC15: Use as laboratory reagent PROC19: Hand-mixing with intimate contact and only PPE available PROC23: Open processing and transfer operations with minerals/ metals at elevated temperature PROC24: High (mechanical) energy work-up of substances bound in materials and/ or articles
Environmental Release Categories	ERC2: Formulation of preparations ERC4: Industrial use of processing aids in processes and products, not becoming part of articles ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC7: Industrial use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC4, ERC6a, ERC6b, ERC7		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Other given operational conditions affecting environmental exposure	Continuous exposure	
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Application Area	Industrial use
	Water	Regular control of the pH value during introduction into open waters is required.,In general discharges should be carried out such that pH changes in receiving surface waters are minimised.,In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.,Risk management measures related to the environment aim to avoid discharging the substance into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes.
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC15, PROC19, PROC23, PROC24		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Concentration of the Substance in Mixture/Article	Concentration of substance in product: > 2%
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	Solid, low dustiness
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	200 days/year
Technical conditions and measures to control dispersion from source towards the worker	Application Area	Industrial use
	Use closed systems or covering of open containers (e.g. screens) Transport over pipes, technical barrel filling/emptying of barrel with automatic systems (suction pumps etc.) Use of pliers, grip arms with long handles with manual use to avoid direct contact and exposure by splashes (no working over one's head)	
Organisational measures to prevent /limit releases, dispersion and exposure	Application Area	Industrial use
	Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects and c) to follow the safety procedures instructed by the employer. The employer has also to ascertain that the required PPE is available	
Conditions and measures related to personal protection, hygiene and health evaluation	Application Area	Industrial use
	In case of dust or aerosol formation: use respiratory protection with approved filter (P2) Wear chemically resistant gloves. material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: >480 min material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min If splashes are likely to occur: wear tightly fitting safety goggles, face–shield Wear suitable protective clothing, aprons, shield and suits Rubber or plastic boots	

3. Exposure estimation and reference to its source

Environment

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, as the toxicity of the metal ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicates that the substance will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is no exposure to the receiving surface water. The sediment compartment is not considered, because it is not relevant for the substance. If emitted to the aquatic compartment, sorption to sediment particles will be negligible. Significant emissions to air are not expected due to the very low vapour pressure of the substance. If emitted to air as a water-based aerosol, the substance will be rapidly neutralised as a result of its reaction with CO2 (or acids). Significant emissions to the terrestrial environment are not expected. The sludge application route is not relevant for the emission to agricultural

soil, as no sorption of the substance to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH- will be neutralised in the soil pore water or the pH may increase. Bioaccumulation will not occur.

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC19, PROC23, PROC24: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC4, PROC5, PROC7, PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC14, PROC15, PROC19, PROC23, PROC24	liquid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.17mg/m³	---
PROC1, PROC2	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.01mg/m³	---
PROC3, PROC15	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.1mg/m³	---
PROC4, PROC5, PROC14	solid, no respiratory protection (RPE), With Local Exhaust Ventilation	Worker - inhalative, short-term - local	0.2mg/m³	---
PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC19	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.5mg/m³	---
PROC23	solid, with RPE (90%)	Worker - inhalative, short-term - local	0.4mg/m³	---
PROC24	solid, with RPE (90%)	Worker - inhalative, short-term - local	0.5mg/m³	---

This substance is corrosive. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Dermal exposure to the substance was not quantified. The substance is not expected to be systemically available in the body under normal handling and use conditions. Systemic effects of NaOH after dermal or inhalation exposure are not expected to occur. Based on workplace measurements and following the proposed risk management measures controlling worker and professional exposure, the inhalation exposure is below the DNEL.

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below
If measured data are not available, the DU may make use of an appropriate scaling tool such as ECETOC TRA.

Important note: By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).

Additional good practice advice beyond the REACH Chemical Safety Assessment

Local exhaust ventilation is not required but good practice.
General ventilation is good practice unless local exhaust ventilation

1. Short title of Exposure Scenario 4: Professional use	
Main User Groups	SU 22: Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process categories	PROC1: Use in closed process, no likelihood of exposure PROC2: Use in closed, continuous process with occasional controlled exposure PROC3: Use in closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) PROC8a: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC11: Non industrial spraying PROC13: Treatment of articles by dipping and pouring PROC15: Use as laboratory reagent PROC19: Hand-mixing with intimate contact and only PPE available PROC23: Open processing and transfer operations with minerals/ metals at elevated temperature PROC24: High (mechanical) energy work-up of substances bound in materials and/ or articles
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems ERC9a: Wide dispersive indoor use of substances in closed systems

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC9a		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Other given operational conditions affecting environmental exposure	Continuous exposure	
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	Application Area	Professional use
	Water	Regular control of the pH value during introduction into open waters is required.,In general discharges should be carried out such that pH changes in receiving surface waters are minimised.,In general most aquatic organisms can tolerate pH values in the range of 6-9. This is also reflected in the description of standard OECD tests with aquatic organisms.,Risk management measures related to the environment aim to avoid discharging the substance into municipal wastewater or to surface water, in case such discharges are expected to cause significant pH changes.
Conditions and measures related to external treatment of waste for disposal	Disposal methods	Waste should be reused or discharged to the industrial wastewater and further neutralized if needed.

2.2 Contributing scenario controlling worker exposure for: PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC15, PROC19, PROC23, PROC24		
Product characteristics	Concentration of the	Covers percentage substance in the product up to

	Substance in Mixture/Article	100 %.
	Concentration of the Substance in Mixture/Article	Concentration of substance in product: > 2%
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	Solid, low dustiness
Frequency and duration of use	Frequency of use	8 hours/day
	Frequency of use	200 days/year
Technical conditions and measures to control dispersion from source towards the worker	Application Area	Professional use
	Use of pliers, grip arms with long handles with manual use to avoid direct contact and exposure by splashes (no working over one's head) Where possible use of specific dispensers and pumps specifically designed to prevent splashes/spills/exposure to occur.	
Organisational measures to prevent /limit releases, dispersion and exposure	Application Area	Professional use
	Replacing, where appropriated, manual processes by automated and/or closed processes. This would avoid irritating mists, sprayings and subsequent potential splashes. Workers in the risky process/areas identified should be trained a) to avoid to work without respiratory protection and b) to understand the corrosive properties and, especially, the respiratory inhalation effects and c) to follow the safety procedures instructed by the employer. The employer has also to ascertain that the required PPE is available	
Conditions and measures related to personal protection, hygiene and health evaluation	Application Area	Professional use
	In case of dust or aerosol formation: use respiratory protection with approved filter (P2) Wear chemically resistant gloves. material: butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: >480 min material: nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min If splashes are likely to occur: wear tightly fitting safety goggles, face–shield Wear suitable protective clothing, aprons, shield and suits Rubber or plastic boots	

3. Exposure estimation and reference to its source

Environment

The aquatic effect and risk assessment only deals with the effect on organisms/ecosystems due to possible pH changes related to OH- discharges, as the toxicity of the metal ion is expected to be insignificant compared to the (potential) pH effect. The high water solubility and very low vapour pressure indicates that the substance will be found predominantly in water. When the risk management measures related to the environment are implemented, there is no exposure to the activated sludge of a sewage treatment plant and there is no exposure to the receiving surface water. The sediment compartment is not considered, because it is not relevant for the substance. If emitted to the aquatic compartment, sorption to sediment particles will be negligible. Significant emissions to air are not expected due to the very low vapour pressure of the substance. If emitted to air as a water-based aerosol, the substance will be rapidly neutralised as a result of its reaction with CO2 (or acids). Significant emissions to the terrestrial environment are not expected. The sludge application route is not relevant for the emission to agricultural soil, as no sorption of the substance to particulate matter will occur in STPs/WWTPs. If emitted to soil, sorption to soil particles will be negligible. Depending on the buffer capacity of the soil, OH- will be neutralised in the soil pore water or the pH may increase. Bioaccumulation will not occur.

Workers

PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19, PROC23, PROC24: ECETOC TRA worker V3

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PROC1, PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC10, PROC11, PROC13, PROC14, PROC15, PROC19, PROC23, PROC24	liquid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.17mg/m³	---
PROC1, PROC2	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.01mg/m³	---
PROC3, PROC15	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.1mg/m³	---
PROC4, PROC5, PROC11, PROC14	solid, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.2mg/m³	---
PROC8a, PROC8b, PROC9, PROC10, PROC13, PROC19	solid, no LEV, no respiratory protection (RPE)	Worker - inhalative, short-term - local	0.5mg/m³	---
PROC23	solid, with RPE (90%)	Worker - inhalative, short-term - local	0.4mg/m³	---
PROC24	solid, with RPE (90%)	Worker - inhalative, short-term - local	0.5mg/m³	---

This substance is corrosive. For the handling of corrosive substances and formulations, immediate dermal contacts occur only occasionally and it is assumed that repeated daily dermal exposure can be neglected. Dermal exposure to the substance was not quantified. The substance is not expected to be systemically available in the body under normal handling and use conditions. Systemic effects of NaOH after dermal or inhalation exposure are not expected to occur. Based on workplace measurements and following the proposed risk management measures controlling worker and professional exposure, the inhalation exposure is below the DNEL.

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PROCs listed above) as given below
If measured data are not available, the DU may make use of an appropriate scaling tool such as ECETOC TRA.
Important note: By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).

Additional good practice advice beyond the REACH Chemical Safety Assessment

Local exhaust ventilation is not required but good practice.
General ventilation is good practice unless local exhaust ventilation

1. Short title of Exposure Scenario 5: Consumer use		
Main User Groups	SU 21: Consumer uses: Private households (= general public = consumers)	
Chemical product category	PC20: Products such as ph-regulators, flocculants, pre-cipitants, neutralization agents PC35: Washing and cleaning products (including solvent based products) PC39: Cosmetics, personal care products	
Environmental Release Categories	ERC8a: Wide dispersive indoor use of processing aids in open systems ERC8b: Wide dispersive indoor use of reactive substances in open systems ERC8d: Wide dispersive outdoor use of processing aids in open systems ERC9a: Wide dispersive indoor use of substances in closed systems	
Activity	Note: this Exposure Scenario is only relevant for an appropriated use according to the quality grade of the substance delivered	
2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8b, ERC8d, ERC9a		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
Technical conditions and measures at process level to prevent release Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil Organizational measures to prevent/limit release from the site	There are no specific risk management measures related to environment.	
Conditions and measures related to external treatment of waste for disposal	Disposal methods	This material and its container must be disposed of in a safe way (e.g. by returning to a public recycling facility)., If container is empty, trash as regular municipal waste., Batteries should be recycled as much as possible (e.g. by returning to a public recycling facility)., Recovery of the substance from alkaline batteries includes emptying the electrolyte, collection and neutralization.
2.2 Contributing scenario controlling consumer exposure for: PC20, PC35, PC39		
Product characteristics	Concentration of the Substance in Mixture/Article	Covers percentage substance in the product up to 100 %.
	Physical Form (at time of use)	liquid
	Physical Form (at time of use)	Solid, low dustiness
Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)	Consumer Measures	It is required to use resistant labelling-package to avoid its auto-damage and loss of the label integrity, under normal use and storage of the product. The lack of quality of the package provokes the physical loss of information on hazards and use instructions. It is advisable to deliver only in very viscous preparations. It is advisable to delivery only in small amounts. For use in batteries, it is required to use completely sealed articles with a long service life maintenance. It is required that improved use instructions, and product information should always be provided to the consumers. This clearly can efficiently reduce

		the risk of misuse. For reducing the number of accidents in which (young) children or elderly people are involved, it should be advisable to use these products in the absence of children or other potential sensitive groups. Do not apply product into ventilator openings or slots. Keep out of the reach of children.
	Consumer Measures	In case of dust or aerosol formation: use respiratory protection with approved filter (P2) Wear impervious chemical resistant protective gloves. If splashes are likely to occur: wear tightly fitting safety goggles, face–shield

3. Exposure estimation and reference to its source

Environment

Consumer uses relate to already diluted products which will further be neutralized quickly in the sewer, well before reaching a WWTP or surface water.

Consumers

PC39, PC20, PC35: ConsExpo and SrayExpo

Contributing Scenario	Specific conditions	Exposure routes	Level of Exposure	RCR
PC20, PC35, PC39	Assessed only for the most critical use, (use of the substance in a spray oven cleaner)	consumer inhalation, acute - local	0.3 - 1.6mg/m³	< 1

The calculated short-term exposure is slightly higher than the long term DNEL for inhalation, but smaller than the short term occupational exposure limit. The substance will be rapidly neutralised as a result of its reaction with CO2 (or other acids). Consumer exposure to the substance in batteries is zero because batteries are sealed articles with a long service life maintenance.

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

The DU works inside the boundaries set by the ES if either the proposed risk management measures as described above are met or the downstream user can demonstrate on his own that his operational conditions and implemented risk management measures are adequate. This has to be done by showing that they limit the inhalation and dermal exposure to a level below the respective DNEL (given that the processes and activities in question are covered by the PCs listed above) as given below
If measured data are not available, the DU may make use of an appropriate scaling tool such as ConsEXpo software.
Important note: By demonstrating a safe use when comparing exposure estimates with the long-term DNEL, the acute DNEL is therefore also covered (according to R.14 guidance, acute exposure levels can be derived by multiplying long-term exposure estimates by a factor of 2).