SAFETY DATA SHEET

KEMIRA ALK 0-2

Ref. 1.1/REG_EU/EN SAFETY DATA SHEET according to Regulation (EC) No. 1907/2006

Revision Date: 26.06.2018 Previous date: 15.12.2016 Print Date:26.10.2021

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

1.1 Product identifier

Commercial Product Name
KEMIRA ALK 0-2 Chemical name: Aluminium sulphate 14-hydrate.

Registration number:
01-2119531538-36

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

Use of the Substance/Mixture

Water treatment chemical

Recommended restrictions on use

Do not use for other purposes than the identified uses.

1.3 Details of the supplier of the safety data sheet

Kemwater Prochemie s.r.o.
Bezdězská 253
293 06 Bradlec CZECH REPUBLIC
Telephone+420326724034, Fax. +420326724030

HEAD OFFICE
Kemira Oyj
P.O. Box 330
00101 HELSINKI
FINLAND
Telephone +358108611 Telefax +358108621124

1.4 Emergency telephone number

Carechem 24 International: +44 (0) 1235 239 670

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EU) 1272/2008(CLP)
Serious eye damage; Category 1; Causes serious eye damage.

2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard statements	:	H318	Causes serious eye damage.
Precautionary statements	:	P264	Wash hands thoroughly after handling.
		P261	Avoid breathing dust.
		Prevention:	
		P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
		Response:	
		P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
		P310	Immediately call a POISON CENTER/doctor.

Hazardous components which must be listed on the label:

- 16828-12-9 Sulfuric acid, aluminum salt (3:2), tetradecahydrate

2.3 Other hazards

Inhalation; Possible risk for irritation of respiratory organs and skin.
Potential environmental effects; May lower the pH of water and thus be harmful to aquatic organisms.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Chemical nature : Granules of aluminium sulphate.

Chemical name	CAS-No. EINECS-No. / ELINCS No.	Concentration [%]
Sulfuric acid, aluminum salt (3:2), tetradecahydrate	16828-12-9	>= 80 - <= 100

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Show this safety data sheet to the doctor in attendance.

Inhalation

Move to fresh air. Rinse nose and mouth with water.

Skin contact

Wash off with soap and plenty of water. Remove and wash contaminated clothing and gloves, including the inside, before re-use.

Eye contact

Important! Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If possible use lukewarm water. Consult a physician. Do not rub the eyes, mechanical irritation. Continue rinsing eyes during transport to hospital.

Ingestion

Rinse mouth with water. Drink 1 or 2 glasses of water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : corrosive effects, May cause irreversible eye damage.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Rinse with plenty of water.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

Extinguishing media : Not combustible.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media : No special requirements.

5.2 Special hazards arising from the substance or mixture

Heating above the decomposition temperature will release toxic gases. (Sulphur oxides (SOx))

5.3 Advice for firefighters

Exposure to decomposition products may be a hazard to health. In the event of fire, wear self-contained breathing apparatus.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. For personal protection see section 8. Sweep up to prevent slipping hazard.

6.2 Environmental precautions

Restrict the spread of the spillage by using inert absorbent material (sand, gravel). Cover the drains. Must be disposed of in accordance with local and national regulations.

6.3 Methods and materials for containment and cleaning up

Clean-up methods - small spillage

Shovel or sweep up. Must be disposed of in accordance with local and national regulations.

.

Clean-up methods - large spillage

Try to keep material dry. In case of precipitation cover with a tarpaulin. Remove spill using a vacuum truck. Shovel or sweep up remaining material. Must be disposed of in accordance with local and national regulations.

6.4 Reference to other sections

Inform the rescue service in case of entry into waterways, soil or drains.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

The product is hygroscopic. Danger for slipping. Avoid dust formation during handling. For personal protection see section 8. The work place and work methods shall be organized in such a way that direct contact with the product is prevented or minimized.

7.2 Conditions for safe storage, including any incompatibilities

Avoid moisture. Keep in a dry place. Avoid freezing. Avoid high temperatures. Keep away from incompatible materials.

Materials for packaging

Suitable material: plastic (PE, PP, PVC), fiberglass-reinforced polyester, epoxy-coated concrete, titanium, acidproof or rubber-coated steel.

Materials to avoid:

Bases, non-acid proof metals (for example aluminium, copper and iron), Avoid contact with unalloyed steel or galvanized surfaces.

Storage stability:

Other data Stable under recommended storage conditions.

7.3 Specific end use(s)

No further information available

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Limit values in other countries

Finland:
Aluminium sulphate
FI OEL, 2005-02-11, HTP-arvot 8h = 1 mg/m³, Aluminium

Sweden:
Aluminium sulphate
SE AFS, 2006, NGV = 1 mg/m³, Calculated as Al

Germany:
Aluminium sulphate
DE TRGS 900, 2007, MAK = 4 mg/m³, inhalable fraction, Calculated as Al
DE TRGS 900, 2007, MAK = 1,5 mg/m³, respirable fraction, Calculated as Al
Biological occupational exposure limits = 0,2 mg/m³, Calculated as Al

Belgium:
Aluminium sulphate
BE OEL, , TWA = 2 mg/m³, Calculated as Al

Switzerland:
Aluminium sulphate
CH SUVA, , TWA = 2 mg/m³, inhalable fraction

Denmark:
Aluminium sulphate
DK OEL, 2007, TWA = 1 mg/m³, Calculated as Al

Estonia:
Aluminium sulphate
EE OEL, , TWA = 2 mg/m³

Spain:
Aluminium sulphate
ES VLA, 2007, VLA-ED = 2 mg/m³, Calculated as Al

France:
Aluminium sulphate
FR VLE, 2007, VME = 2 mg/m³, Calculated as Al

Great Britain:
Aluminium sulphate
LT OEL, , TWA = 2 mg/m³

Greece:
Aluminium sulphate
IE OEL, , TWA = 2 mg/m³, Calculated as Al

Ireland:
Aluminium sulphate
GR OEL, , TWA = 2 mg/m³

Lithuania:
Aluminium sulphate
UK EH40, , TWA = 1 mg/m³

Netherlands:
Aluminium sulphate
NL OEL, 2007, TWA = 2 mg/m³, : Administrative

Norway:
Aluminium sulphate
NO OEL, 2007, TWA = 2 mg/m³, Calculated as Al

Portugal:
Aluminium sulphate
PT OEL, , TWA = 2 mg/m³, Calculated as Al

DNEL

Sulfuric acid, aluminum salt (3:2), tetradecahydrate	:	Exposure routes: Dermal Potential health effects: Systemic effects, Long-term Value: 3,8 mg/kg bw/day Most sensitive endpoint:, neurotoxicity (oral) Exposure routes: Oral Potential health effects: Systemic effects, Long-term Value: 13,4 mg/m³ Most sensitive endpoint:, neurotoxicity (oral) Exposure routes: Eye contact Potential health effects: Local effects Medium hazard (no threshold derived)

PNEC

Sulfuric acid, aluminum salt (3:2), tetradecahydrate	:	Sewage treatment plant The PNEC value would be highly depending on conditions as pH and organic matter, and therefore a true PNEC cannot and does not need to be derived.

Oral
Bioaccumulative potential, Secondary poisoning, not significant, Derivation of the PNEC, Not relevant

Soil
study scientifically unjustified

Water
Not relevant,The compound is considered to have no long term effects in aquatic systems due to the rapid formation of insoluble hydroxides.

Air
Not relevant

The PNEC value would be highly depending on conditions as pH and organic matter, and therefore a true PNEC cannot and does not need to be derived.

8.2 Exposure controls

8.2.1 **Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice.

Eye wash bottle or emergency eye-wash fountain must be found in the work place.

8.2.2 Individual protection measures, such as personal protective equipment

Hand protection

Glove material: PVC and neoprene gloves

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.Gloves should be removed and replaced immediately if there is any indication of degradation or chemical breakthrough.

Eye protection

Tightly fitting safety goggles or face-shield. Eye wash bottle with pure water
(EN 166)

Skin and body protection

Wear protective clothing if necessary.

Respiratory protection

Respiratory protection is not required under normal handling conditions. If aerosols or mist are formed, eg. when cleaning containers with a high pressure washer, use half mask with dust filter P2.

8.2.3 Environmental exposure controls

Prevent product from entering the environment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

General Information (appearance, odour)

Physical state	solid, granules
Colour	white
Odour	not significant

Important health safety and environmental information

pH	ca. 3 (10 % solution)
Melting point/range	Not applicable
Boiling point/boiling range	Not applicable
Flash point	Not applicable, inorganic compound In accordance with column 2 of REACH Annex VII, the study does not need to be conducted.
Flammability (solid, gas)	Does not sustain combustion.
Explosive properties:	
Lower explosion limit	Not applicable
Upper explosion limit	Not applicable
Vapour pressure	Not applicable In accordance with column 2 of REACH Annex VII, the study does not need to be conducted.
Density	1,51 - 1,65 g/cm³ (20 °C)
Bulk density	820 - 990 kg/m³
Solubility(ies):	
Water solubility	soluble
Partition coefficient: n-octanol/water	Not applicable, inorganic compound
Thermal decomposition	650 °C
Viscosity:	
Viscosity, kinematic	

	In accordance with Section 1 of REACH Annex XI, the study does not need to be conducted.
Oxidizing	Not oxidizing

9.2 Other data

Surface tension	No data available

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Can corrode base metals in the presence of water.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions	:	Corrodes metals under influence of moisture.

10.4 Conditions to avoid

Conditions to avoid	:	Corrosion might appear in contact with moisture. Humidity or contact with water may cause lumpiness.

10.5 Incompatible materials

Materials to avoid	:	Bases non-acid proof metals (for example aluminium, copper and iron) Avoid contact with unalloyed steel or galvanized surfaces.

10.6 Hazardous decomposition products

Hazardous decomposition products	:	Sulphur oxides (SOx)
Thermal decomposition	:	650 °C

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

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

Aluminium sulphate:
LD50/Oral/Rat: > 2 000 mg/kg
Not classified as harmful if swallowed.

LC50/Inhalation/Rat: > 5 mg/l
Remarks: No known significant effects or critical hazards., Read-across (Analogy), CAS-No., 39290-78-3

LD50/Dermal/Rabbit: > 5 000 mg/kg
Not classified as harmful to health.

Sulfuric acid, aluminum salt (3:2), tetradecahydrate:
LD50/Oral/Rat: > 2 000 mg/kg
Remarks:CAS-No., 10043-01-3
Not classified as harmful if swallowed.

LC50/Inhalation/Rat: > 5 mg/l
Remarks: No known significant effects or critical hazards., Read-across (Analogy), CAS-No., 39290-78-3

LD50/Dermal/Rabbit: > 5 000 mg/kg
Not classified as harmful to health.

Irritation and corrosion

Skin:
Repeated or prolonged skin contact may cause: Skin irritation dry skin

Eyes:
Causes serious eye damage.

Respiratory system:
Inhalation of dust may cause irritation.

Aluminium sulphate:

Skin: Rabbit/OECD Test Guideline 404: No skin irritation

Eyes: Rabbit/OECD Test Guideline 405: Severe eye irritation
May cause irreversible eye damage.

Sulfuric acid, aluminum salt (3:2), tetradecahydrate:

Skin: Rabbit/OECD Test Guideline 404: No skin irritation
Remarks: CAS-No. 10043-01-3

Eyes: Rabbit/OECD Test Guideline 405: Severe eye irritation
Remarks: May cause irreversible eye damage.

Sensitisation

Aluminium sulphate**:**
Guinea pig/OECD Test Guideline 406
Remarks: Read-across (Analogy) CAS-No. 1327-41-9
Not sensitizing.

Long term toxicity

Aluminium sulphate:
Repeated dose toxicity:
Oral/Rat/OECD Test Guideline 422:
NOAEL: 562 mg/kg
Remarks: bw/day Systemic toxicity Read-across (Analogy) CAS-No. 1327-41-9

NOAEL: 90 mg/kg
Remarks: bw/day Calculated as Al

Oral/Rat/OECD Test Guideline 422:
NOAEL: 112 mg/kg
Remarks: bw/day Local effects Read-across (Analogy) CAS-No. 1327-41-9

NOAEL: 18 mg/kg
Remarks: bw/day Calculated as Al

Carcinogenicity
Oral/Rat/2 years:
Did not show carcinogenic effects in animal experiments.

Mutagenicity
Mutagenicity (Salmonella typhimurium - reverse mutation assay)/AMES test/OECD Test Guideline 471:
Result: negative
Metabolic activation: with and without

In vitro mammalian cells/micronucleus test/OECD Test Guideline 487:
Result: negative
Metabolic activation: with and without

In vitro gene mutation study in mammalian cells/Lymphoma/OECD Test Guideline 476:
Result: negative
Metabolic activation: with and without

Reproductive toxicity

Oral/Rat/female/Reproductive effects/OECD Test Guideline 452:
NOAEL: 3 225 mg/kg
NOAEL F1:
Remarks: bw/day Read-across (Analogy) CAS-No. 31142-56-0
Not believed to be toxic for reproduction.

Oral/Rat/female/Reproductive effects/OECD Test Guideline 452:
NOAEL: 300 mg/kg
NOAEL F1:
Remarks: bw/day Calculated as Al Read-across (Analogy) CAS-No. 31142-56-0

Oral/Rat/male and female/Developmental toxicity test/OECD Test Guideline 422:
NOAEL: 1 000 mg/kg
NOAEL F1: 1 000 mg/kg
Remarks: bw/day Read-across (Analogy) CAS-No. 1327-41-9
Not believed to be toxic for reproduction. In animal studies, did not interfere with reproduction.

Oral/male and female/OECD Test Guideline 422:
NOAEL: 90 mg/kg
NOAEL F1: 90 mg/kg
Remarks: bw/day Calculated as Al Read-across (Analogy) CAS-No. 1327-41-9

Teratogenicity

Oral/Rat/OECD Test Guideline 452:
NOAEL: 323 mg/kg
Mother: 3 225 mg/kg
bw/day Read-across (Analogy) CAS-No. 31142-56-0

Oral/Rat/OECD Test Guideline 452:
NOAEL: 30 mg/kg
Mother: 300 mg/kg
bw/day Calculated as Al CAS-No. 31142-56-0 Read-across (Analogy)

Target organ

The substance is not classified.
STOT - repeated exposure

The substance is not classified.
STOT - single exposure

Sulfuric acid, aluminum salt (3:2), tetradecahydrate:
Repeated dose toxicity:

Oral/Rat/OECD 422:
NOAEL: 114 mg/kg
Remarks: bw/day Local effects Read-across (Analogy) CAS-No. 1327-41-9

/OECD Test Guideline 422:
NOAEL: 18 mg/kg
Remarks: bw/day Calculated as Al

Carcinogenicity
Oral/Rat/2 years:
Did not show carcinogenic effects in animal experiments.

Mutagenicity
Mutagenicity (Salmonella typhimurium - reverse mutation assay)/AMES test/OECD Test Guideline 471:
Result: negative
Metabolic activation: with and without

In vitro mammalian cells/micronucleus test/OECD Test Guideline 487:
Result: negative
Metabolic activation: with and without

In vitro gene mutation study in mammalian cells/Lymphoma/OECD Test Guideline 476:
Result: negative
Metabolic activation: with and without

/Mutation test: in vivo:
No data available

Reproductive toxicity
Oral/Rat/female/Reproductive effects/OECD Test Guideline 452:
NOAEL: 3 225 mg/kg
NOAEL F1:
Remarks: bw/day Read-across (Analogy) CAS-No. 31142-56-0
Not believed to be toxic for reproduction.

Oral/Rat/female/Reproductive effects/OECD Test Guideline 452:
NOAEL: 300 mg/kg
NOAEL F1:
Remarks: bw/day Calculated as Al Read-across (Analogy) CAS-No. 31142-56-0
Not believed to be toxic for reproduction.

/Rat/male and female/Screening test/OECD Test Guideline 422:
NOAEL: 1 000 mg/kg
NOAEL F1: 1 000 mg/kg
Remarks: bw/day Read-across (Analogy) CAS-No. 1327-41-9
No known effect.

/male and female/OECD Test Guideline 422:
NOAEL: 90 mg/kg
NOAEL F1: 90 mg/kg
Remarks: bw/day Calculated as Al Read-across (Analogy) CAS-No. 1327-41-9

Teratogenicity

Oral/Rat/OECD Test Guideline 452:
NOAEL: 323 mg/kg
Mother: 3 225 mg/kg
bw/day Read-across (Analogy) CAS-No. 31142-56-0

Oral/Rat/OECD Test Guideline 452:
NOAEL: 30 mg/kg
Mother: 300 mg/kg
bw/day Calculated as Al CAS-No. 31142-56-0 Read-across (Analogy)

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Aquatic toxicity

This material is not classified as dangerous for the environment. At environmentally relevant pH 5,5 – 8, the solubility of aluminium is low. Aluminium salts dissociate with water resulting in rapid formation and precipitation of aluminium hydroxides. At pH <5.5, the free ion (Al3+) becomes the prevalent form, the increased availability at this pH is reflected in higher toxicity. At pH 6.0–7.5, solubility declines due to the presence of insoluble Al(OH)3. At higher pH (pH >8.0), the more soluble Al(OH)4 - species predominate, which again increases availability.
Aluminium salts must not be released to rivers and lakes in an uncontrolled way and pH variations around 5 - 5.5 should be avoided.

Aluminium sulphate:
LC50/96 h/Danio rerio/semi-static test/OECD Test Guideline 203: > 562 mg/l
NOEC/96 h/Danio rerio/semi-static test/OECD Test Guideline 203: > 562 mg/l
LC50/96 h/Danio rerio/semi-static test/OECD Test Guideline 203: > 0,247 mg/l
Calculated as Al Maximum soluble concentration under the test conditions.

EC50/48 h/Daphnia magna (Water flea)/semi-static test/OECD Test Guideline 202: > 90 mg/l
NOEC/48 h/Daphnia magna (Water flea)/semi-static test/OECD Test Guideline 202: > 90 mg/l
LC50/48 h/Daphnia magna (Water flea)/OECD Test Guideline 202: > 0,176 mg/l
Calculated as Al Maximum soluble concentration under the test conditions.

EC50/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 24 mg/l
EC50/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 3,8 mg/l
Calculated as Al

NOEC/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 1,7 mg/l
NOEC/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 0,27 mg/l
Calculated as Al

Sulfuric acid, aluminum salt (3:2), tetradecahydrate:
LC50/96 h/Danio rerio/semi-static test/OECD Test Guideline 203: > 1 000 mg/l
NOEC/Danio rerio/semi-static test/OECD Test Guideline 203: > 1 000 mg/l
LC50/Danio rerio/semi-static test/OECD Test Guideline 203: > 0,247 mg/l
Calculated as Al Maximum soluble concentration under the test conditions.

EC50/48 h/Daphnia magna (Water flea)/semi-static test/OECD Test Guideline 202: > 160 mg/l
NOEC/48 h/Daphnia magna (Water flea)/semi-static test/OECD Test Guideline 202: > 160 mg/l
EC50/48 h/Daphnia magna (Water flea)/semi-static test/OECD Test Guideline 202: > 0,176 mg/l
Calculated as Al Maximum soluble concentration under the test conditions.

EC50/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: > 41,5 mg/l
EC50/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 3,8 mg/l
Calculated as Al
NOEC/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 3,0 mg/l
NOEC/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 0,27 mg/l
Calculated as Al

Toxicity to other organisms

No data is available on the product itself.

Aluminium sulphate:

No data available

Sulfuric acid, aluminum salt (3:2), tetradecahydrate:

Remarks: No data available

12.2 Persistence and degradability

Biological degradability:

The methods for determining the biological degradability are not applicable to inorganic substances.

Chemical degradation**:**

Remarks: Reaction with water forms aluminium hydroxide precipitates.

Biological degradability:
Aluminium sulphate:

The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

The product is not expected to bioaccumulate.
Partition coefficient: n-octanol/water: Not applicable, inorganic compound

Aluminium sulphate:

The product is not expected to bioaccumulate.
Partition coefficient: n-octanol/water: Not applicable, inorganic compound

12.4.Mobility in soil

Mobility

Water solubility: soluble
Surface tension: No data available

12.5. Results of PBT and vPvB assessment

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.

12.6 Other adverse effects

May lower the pH of water and thus be harmful to aquatic organisms.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product	Classified as hazardous waste.Must be disposed of in accordance with local and national regulations. Thoroughly cleaned packaging material may be recycled.
Contaminated packaging	Packages that cannot be cleaned must be disposed of the same way as the unused product. Must be disposed of in accordance with local and national regulations.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number

Land transport

Not classified as dangerous in the meaning of transport regulations.

Sea transport

Not classified as dangerous in the meaning of transport regulations.

Air transport

Not classified as dangerous in the meaning of transport regulations.

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

Not classified as marine pollutant

14.8 Special precautions for user

None known.

SECTION 15: REGULATORY INFORMATION

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

Notification status

AICS	:	All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on the Australian Inventory of Chemical Substances (AICS).
DSL	:	All components of this product are included in the Canada Domestic Substance List (DSL) or are not required to be listed on the Canada Domestic Substance List (DSL).
IECSC	:	All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.
EINECS	:	All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.
	:	
ENCS	:	All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese (ENCS) inventory.
KECI	:	All components of this product are included in the Korean (ECL) inventory or are not required to be listed on the Korean (ECL) inventory.

PICCS	:	All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine (PICCS) inventory.
TSCA	:	All components of this product are included in the United States TSCA Chemical Inventory or are not required to be listed on the United States TSCA Chemical Inventory.
NZIoC	:	All components of this product are included in the New Zealand inventory (NZIoC) or are not required to be listed on the New Zealand inventory(NZIoC).

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 section 3.

H318 Causes serious eye damage.

Training advice

Read the safety data sheet before using the product.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Sources of key data used to compile the Safety Data Sheet

Regulations, databases, literature, own tests.

Additions, Deletions, Revisions

Relevant changes have been marked with vertical lines.

Annex

Contents: Exposure scenario

1. **ES 1., Manufacture of substance, ES 2., Formulation and distribution, Solid, low dustiness, Industrial use**
   SU 3; ES 1., SU 8,9, ES 2., SU 10; ES 1., ERC1, ES 2., ERC2; ES 1. & ES 2., PROC1, PROC2, PROC3, PROC4, PROC8b, PROC15, ES 2., PROC5, PROC8a, PROC9, PROC14, PROC19;

2. **ES 1., Manufacture of substance, ES 2., Formulation and distribution, Aqueous solution, Industrial use**
   SU 3; ES 1., SU 8,9, ES 2., SU 10; ES 1., ERC1, ES 2., ERC2; ES 1. & ES 2., PROC1, PROC2, PROC3, PROC4, PROC8b, PROC15, ES 2., PROC5, PROC8a, PROC9, PROC14, PROC19;

3. **ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Solid, low dustiness, Industrial use**
   SU 3; ES 3. & ES 4., SU6b, ES 3., SU8, SU9, SU14, ES 4., SU7, SU5; ES 3. & ES 4., ERC4, ERC5, ERC6a, ERC8a, ES 3., ERC1, ERC2, ES 4., ERC3, ERC6b, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a; ES 3. & ES 4., PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, ES 3., PROC4, PROC15, ES 4., PROC5, PROC7, PROC19; ES 3. & ES 4., PC19, PC20, PC21, PC26, ES 4., PC9a, PC23, PC34, PC35;

4. **ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Aqueous solution, Industrial use**
   SU 3; ES 3. & ES 4., SU6b, ES 3., SU8, SU9, SU14, ES 4., SU7, SU5; ES 3. & ES 4., ERC4, ERC5, ERC6a, ERC8a, ES 3., ERC1, ERC2, ES 4., ERC3, ERC6b, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a; ES 3. & ES 4., PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, ES 3., PROC4, PROC15, ES 4., PROC5, PROC7, PROC19; ES 3. & ES 4., PC19, PC20, PC21, PC26, ES 4., PC9a, PC23, PC34, PC35;

5. **ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Solid, low dustiness, Professional use**
   SU 22; ES 3. & ES 4., SU6b, ES 3., SU8, SU9, SU14, ES 4., SU7, SU5; ES 3. & ES 4., ERC4, ERC5, ERC6a, ERC8a, ES 3., ERC1, ERC2, ES 4., ERC3, ERC6b, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a; ES 3. & ES 4., PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, ES 3., PROC4, PROC15, ES 4., PROC5, PROC11, PROC19; ES 3. & ES 4., PC19, PC20, PC21, PC26, ES 4., PC9a, PC23, PC34, PC35;

6. **ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Aqueous solution, Professional use**
   SU 22; ES 3. & ES 4., SU6b, ES 3., SU8, SU9, SU14, ES 4., SU7, SU5; ES 3. & ES 4., ERC4, ERC5, ERC6a, ERC8a, ES 3., ERC1, ERC2, ES 4., ERC3, ERC6b, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a; ES 3. & ES 4., PROC1, PROC2, PROC3, PROC8a, PROC8b, PROC9, ES 3., PROC4, PROC15, ES 4., PROC5, PROC11, PROC19; ES 3. & ES 4., PC19,

PC20, PC21, PC26, ES 4., PC9a, PC23, PC34, PC35;

7. **ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Solid, low dustiness, Industrial use**
   SU 3; ES 5. & ES 6., SU5, SU6b, ES 5., SU1, SU7, SU13, SU19, ES 6., SU2, SU23; ES 5. & ES 6., ERC2, ERC4, ERC6b, ERC8a, ERC8b, ES 5., ERC3, ERC5, ERC6a, ERC8c, ERC8f, ERC10a, ERC11a, ES 6., ERC8d; ES 5. & ES 6., PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC19, ES 5., PROC1, PROC6, PROC10, PROC13, PROC14, PROC15; ES 5. & ES 6., PC20, PC21, ES 5., PC1, PC9a, PC12, PC19, PC23, PC26, PC34, PC35, ES 6., PC37;

8. **ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Solid, low dustiness, Professional use**
   SU 22; ES 5. & ES 6., SU5, SU6b, ES 5., SU1, SU7, SU13, SU19, ES 6., SU2, SU23; ES 5. & ES 6., ERC2, ERC4, ERC6b, ERC8a, ERC8b, ES 5., ERC3, ERC5, ERC6a, ERC8c, ERC8f, ERC10a, ERC11a, ES 6., ERC8d; ES 5. & ES 6., PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC19, ES 5., PROC1, PROC6, PROC10, PROC13, PROC14, PROC15; ES 5. & ES 6., PC20, PC21, ES 5., PC1, PC9a, PC12, PC19, PC23, PC26, PC34, PC35, ES 6., PC37;

9. **ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Industrial use**
   SU 3; ES 5. & ES 6., SU5, SU6b, ES 5., SU1, SU7, SU13, SU19, ES 6., SU2, SU23; ES 5. & ES 6., ERC2, ERC4, ERC6b, ERC8a, ERC8b, ES 5., ERC3, ERC5, ERC6a, ERC8c, ERC8f, ERC10a, ERC11a, ES 6., ERC8d; ES 5. & ES 6., PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC19, ES 5., PROC1, PROC6, PROC10, PROC13, PROC14, PROC15; ES 5. & ES 6., PC20, PC21, ES 5., PC1, PC9a, PC12, PC19, PC23, PC26, PC34, PC35, ES 6., PC37;

10. **ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Professional use**
    SU 22; ES 5. & ES 6., SU5, SU6b, ES 5., SU1, SU7, SU13, SU19, ES 6., SU2, SU23; ES 5. & ES 6., ERC2, ERC4, ERC6b, ERC8a, ERC8b, ES 5., ERC3, ERC5, ERC6a, ERC8c, ERC8f, ERC10a, ERC11a, ES 6., ERC8d; ES 5. & ES 6., PROC2, PROC3, PROC4, PROC5, PROC8a, PROC8b, PROC9, PROC19, ES 5., PROC1, PROC6, PROC10, PROC13, PROC14, PROC15; ES 5. & ES 6., PC20, PC21, ES 5., PC1, PC9a, PC12, PC19, PC23, PC26, PC34, PC35, ES 6., PC37;

11. **ES 7., Use as a laboratory chemical (industrial), Use as a laboratory chemical (professional), Solid, low dustiness**
    SU 3; SU9; ERC4; PROC15; PC21;

12. **ES 7., Use as a laboratory chemical (industrial), Use as a laboratory chemical (professional), Aqueous solution**
    SU 3; SU9; ERC4; PROC15; PC21;

13. **ES 8., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Consumer use**
    SU 21; SU1, SU13, SU19, SU23, SU21; ERC8a, ERC8f, ERC10a, ERC11a; PC12, PC20,

PC35, PC37, PC19, PC39;

1. Short title of Exposure Scenario: ES 1., Manufacture of substance, ES 2., Formulation and distribution, Solid, low dustiness, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 1.:** Manufacture of substance **SU 8,9:** Manufacture of bulk, large scale substances (including petroleum products); manufacture of fine chemicals **ES 2.:** Formulation and distribution **SU 10:** Formulation
Process category	:	**ES 1. & ES 2.:** Manufacture of substance & formulation and distribution **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 **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC15:** Use as laboratory reagent **ES 2.:** Formulation and distribution **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 **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 **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ES 1.:** Manufacture of substance **ERC1:** Manufacture of substances **ES 2.:** Formulation and distribution **ERC2:** Formulation of preparations

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently)., ECETOC TRA v3.0
Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Stay upwind/ keep distance from source.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training., Wear respiratory protection. (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC1

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC2

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment	Specific conditions	Value type	Level of Exposure	Risk characterisation

	Method				ratio (PEC/PNEC):
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use, Professional use	Combined		0,217
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		0,113
PROC4	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,131
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,239
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8a	ECETOC TRA	Industrial use, Professional	Worker - dermal, long-	0,823 mg/kg bw/day	0,216

		use	term - systemic		
PROC8a	ECETOC TRA	Industrial use, Professional use	Combined		0,239
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,221
PROC9	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,113
PROC14	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC14	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Industrial use	Combined		0,059
PROC15	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,058
PROC19	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC19	RISKOFDERM	Industrial use, Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use, Professional use	Combined		0,376

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 1., Manufacture of substance, ES 2., Formulation and distribution, Aqueous solution, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 1.:** Manufacture of substance **SU 8,9:** Manufacture of bulk, large scale substances (including petroleum products); manufacture of fine chemicals **ES 2.:** Formulation and distribution **SU 10:** Formulation
Process category	:	**ES 1. & ES 2.:** Manufacture of substance & formulation and distribution **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 **PROC8b:** Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities **PROC15:** Use as laboratory reagent **ES 2.:** Formulation and distribution **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 **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 **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ES 1.:** Manufacture of substance **ERC1:** Manufacture of substances **ES 2.:** Formulation and distribution **ERC2:** Formulation of preparations

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measures identified.

Conditions and measures related to personal protection, hygiene and health evaluation

Produced in a closed system, and during working procedures, exposure to this substance is possible only in case of leaks.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C

Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in

laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in		Covers the percentage of the substance in the product up to

Mixture/Article		100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational

hygiene is implemented.

Technical conditions and measures
Stay upwind/keep distance from source.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training., Wear respiratory protection., (APF, Assigned Protection Factor = 10) (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC2

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC1

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was

performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC1	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC1	ECETOC TRA	Industrial use	Combined		0,012
PROC2	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC2	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use	Combined		0,28
PROC3	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC3	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use	Combined		0,173
PROC4	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,28
PROC8a	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8a	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216

PROC8a	ECETOC TRA	Industrial use	Combined		0,28
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,28
PROC9	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,172
PROC14	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC14	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Industrial use	Combined		0,118
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,118
PROC19	ECETOC TRA	Industrial use	Worker - inhalative	1,711 mg/m³	0,128
PROC19	RISKOFDERM	Industrial use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use	Combined		0,481

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Solid, low dustiness, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **SU6b:** Manufacture of pulp, paper and paper products **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **SU8:** Manufacture of bulk, large scale chemicals (including petroleum products) **SU9:** Manufacture of fine chemicals **SU14:** Manufacture of basic metals, including alloys **ES 4.:** Use in spraying formulations. **SU7:** Printing and reproduction of recorded media **SU5:** Manufacture of textiles, leather, fur
Product category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **PC19:** Intermediate **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **ES 4.:** Use in spraying formulations. **PC9a:** Coatings and paints, thinners, paint removers **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products)
Process category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **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) **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC15:** Use as laboratory reagent **ES 4.:** Use in spraying formulations. **PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) **PROC7:** Industrial spraying **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **ERC1:** Manufacture of substances **ERC2:** Formulation of preparations **ES 4.:** Use in spraying formulations. **ERC3:** Formulation in materials **ERC6b:** Industrial use of reactive processing aids **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **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 **ERC10a:** Wide dispersive outdoor use of long-life articles and materials with low release **ERC11a:** Wide dispersive indoor use of long-life articles and materials with low release

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated

differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC7

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands plus forearms (1500 cm^2).

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 95 %)Wear respiratory protection., (APF, Assigned Protection Factor = 10) (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently)., ECETOC TRA v3.0
Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Stay upwind/ keep distance from source.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC2, ERC4, ERC5, ERC6a, ERC8a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing	Exposure	Specific	Value type	Level of	Risk

Scenario	Assessment Method	conditions		Exposure	characterisation ratio (PEC/PNEC):
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use, Professional use	Combined		0,217
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		0,113
PROC4	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,131
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,239
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker -	1,286 mg/kg	0,338

			dermal, long-term - systemic	bw/day	
PROC5	ECETOC TRA	Industrial use	Combined		0,343
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use, Professional use	Combined		0,239
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,221
PROC9	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,113
PROC15	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,058
PROC19	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC19	RISKOFDERM	Industrial use, Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use, Professional use	Combined		0,376

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Aqueous solution, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **SU6b:** Manufacture of pulp, paper and paper products **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **SU8:** Manufacture of bulk, large scale chemicals (including petroleum products) **SU9:** Manufacture of fine chemicals **SU14:** Manufacture of basic metals, including alloys **ES 4.:** Use in spraying formulations. **SU7:** Printing and reproduction of recorded media **SU5:** Manufacture of textiles, leather, fur
Product category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **PC19:** Intermediate **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **ES 4.:** Use in spraying formulations. **PC9a:** Coatings and paints, thinners, paint removers **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products)
Process category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **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) **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC15:** Use as laboratory reagent **ES 4.:** Use in spraying formulations. **PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) **PROC7:** Industrial spraying **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **ERC1:** Manufacture of substances **ERC2:** Formulation of preparations **ES 4.:** Use in spraying formulations. **ERC3:** Formulation in materials **ERC6b:** Industrial use of reactive processing aids **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **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 **ERC10a:** Wide dispersive outdoor use of long-life articles and materials with low release **ERC11a:** Wide dispersive indoor use of long-life articles and materials with low release

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measures identified.

Conditions and measures related to personal protection, hygiene and health evaluation

Produced in a closed system, and during working procedures, exposure to this substance is possible only in case of leaks.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor

Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC7

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

: < 0,07 kg/min

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	3 - 5
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Effective exhaust ventilation system

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training., Wear respiratory protection., (APF, Assigned Protection Factor = 10) (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in		Covers the percentage of the substance in the product up to

Mixture/Article		100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	3 - 5
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational

hygiene is implemented.

Technical conditions and measures
Stay upwind/keep distance from source.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)Wear respiratory protection., (APF, Assigned Protection Factor = 20) (Effectiveness: 95 %)

2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC2, ERC4, ERC5, ERC6a, ERC8a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum

compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC1	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC1	ECETOC TRA	Industrial use	Combined		0,012
PROC2	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC2	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use	Combined		0,28
PROC3	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC3	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use	Combined		0,173
PROC4	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,28
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	2,994 mg/m³	0,223
PROC5	ECETOC TRA	Industrial use	Worker -	0,91 mg/kg	0,24

			dermal, long-term - systemic	bw/day	
PROC5	ECETOC TRA	Industrial use	Combined		0,463
PROC8a	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8a	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use	Combined		0,28
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,28
PROC9	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,172
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,118
PROC19	ECETOC TRA	Industrial use	Worker - inhalative	1,711 mg/m³	0,128
PROC19	RISKOFDERM	Industrial use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use	Combined		0,481

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Solid, low dustiness, Professional use

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **SU6b:** Manufacture of pulp, paper and paper products **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **SU8:** Manufacture of bulk, large scale chemicals (including petroleum products) **SU9:** Manufacture of fine chemicals **SU14:** Manufacture of basic metals, including alloys **ES 4.:** Use in spraying formulations. **SU7:** Printing and reproduction of recorded media **SU5:** Manufacture of textiles, leather, fur
Product category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **PC19:** Intermediate **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **ES 4.:** Use in spraying formulations. **PC9a:** Coatings and paints, thinners, paint removers **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products)
Process category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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)

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)
ES 3.: Use of substance in synthesis as a process chemical and as an intermediate.
PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises
PROC15: Use as laboratory reagent
ES 4.: Use in spraying formulations.
PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact)
PROC11: Non industrial spraying
PROC19: Hand-mixing with intimate contact and only PPE available

Environmental release category : **ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations.
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)
ERC8a: Wide dispersive indoor use of processing aids in open systems
ES 3.: Use of substance in synthesis as a process chemical and as an intermediate.
ERC1: Manufacture of substances
ERC2: Formulation of preparations
ES 4.: Use in spraying formulations.
ERC3: Formulation in materials
ERC6b: Industrial use of reactive processing aids
ERC8b: Wide dispersive indoor use of reactive substances in open systems
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
ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release
ERC11a: Wide dispersive indoor use of long-life articles and materials with low release

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 0,12 kg/min

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Effective exhaust ventilation system

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training., Wear respiratory protection., (APF, Assigned Protection Factor = 10) (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance.

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
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently)., ECETOC TRA v3.0
Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately., Stay upwind/ keep distance from source.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC2, ERC4, ERC5, ERC6a, ERC8a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01

PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use, Professional use	Combined		0,217
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		0,113
PROC4	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,6 mg/m³	0,045
PROC4	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Professional use	Combined		0,153
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,12 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,164 mg/kg bw/day	0,043
PROC5	ECETOC TRA	Industrial use	Combined		0,052
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use, Professional use	Combined		0,239

PROC8b	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8b	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Professional use	Combined		0,239
PROC9	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC9	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Professional use	Combined		0,131
PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,1 mg/m³	< 0,01
PROC5	RISKOFDERM	Professional use	Worker - dermal, long-term - systemic	1,11 mg/kg bw/day	0,292
PROC5	ECETOC TRA	Professional use	Combined		0,3
PROC15	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,058
PROC19	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC19	RISKOFDERM	Industrial use, Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use, Professional use	Combined		0,376

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 3., Use of substance in synthesis as a process chemical and as an intermediate., ES 4., Use in spraying formulations., Aqueous solution, Professional use

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **SU6b:** Manufacture of pulp, paper and paper products **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **SU8:** Manufacture of bulk, large scale chemicals (including petroleum products) **SU9:** Manufacture of fine chemicals **SU14:** Manufacture of basic metals, including alloys **ES 4.:** Use in spraying formulations. **SU7:** Printing and reproduction of recorded media **SU5:** Manufacture of textiles, leather, fur
Product category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **PC19:** Intermediate **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **ES 4.:** Use in spraying formulations. **PC9a:** Coatings and paints, thinners, paint removers **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products)
Process category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **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) **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **PROC4:** Use in batch and other process (synthesis) where opportunity for exposure arises **PROC15:** Use as laboratory reagent **ES 4.:** Use in spraying formulations. **PROC5:** Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) **PROC11:** Non industrial spraying **PROC19:** Hand-mixing with intimate contact and only PPE available
Environmental release category	:	**ES 3. & ES 4.:** Use of substance in synthesis as a process chemical and as an intermediate & use in spraying formulations. **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) **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ES 3.:** Use of substance in synthesis as a process chemical and as an intermediate. **ERC1:** Manufacture of substances **ERC2:** Formulation of preparations **ES 4.:** Use in spraying formulations. **ERC3:** Formulation in materials **ERC6b:** Industrial use of reactive processing aids **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **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 **ERC10a:** Wide dispersive outdoor use of long-life articles and materials with low release **ERC11a:** Wide dispersive indoor use of long-life articles and materials with low release

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measures identified.

Conditions and measures related to personal protection, hygiene and health evaluation

Produced in a closed system, and during working procedures, exposure to this substance is possible only in case of leaks.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in

laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in		Covers the percentage of the substance in the product up to

Mixture/Article		100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC11

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

: < 0,07 kg/min

Frequency and duration of use

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Effective exhaust ventilation system

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training., Wear respiratory protection., (APF, Assigned Protection Factor = 20) (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)Wear respiratory protection., (APF, Assigned Protection Factor = 20) (Effectiveness: 95 %)

2.1 Contributing scenario controlling environmental exposure for: ERC1, ERC2, ERC4, ERC5, ERC6a, ERC8a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC1	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC1	ECETOC TRA	Industrial use	Combined		0,012
PROC2	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC2	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use	Combined		0,28
PROC3	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC3	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use	Combined		0,173
PROC4	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,171 mg/m³	0,013
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Professional use	Combined		0,229
PROC8a	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8a	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use	Combined		0,28
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,28
PROC9	ECETOC TRA	Industrial use	Worker -	0,855 mg/m³	0,064

			inhalative		
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Professional use	Worker - inhalative	1,711 mg/m³	0,128
PROC5	RISKOFDERM	Professional use	Worker - dermal, long-term - systemic	0,91 mg/kg bw/day	0,24
PROC5	ECETOC TRA	Professional use	Combined		0,367
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,118
PROC19	ECETOC TRA	Professional use	Worker - inhalative	0,365 mg/m³	0,022
PROC19	RISKOFDERM	Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,292
PROC19	ECETOC TRA	Professional use	Combined		0,314

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Solid, low dustiness, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **SU5:** Manufacture of textiles, leather, fur **SU6b:** Manufacture of pulp, paper and paper products **ES 5.:** Use of substance in non-spraying formulations. **SU1:** Agriculture, forestry, fishery **SU7:** Printing and reproduction of recorded media **SU13:** Manufacture of other non-metallic mineral products, e.g. plasters, cement **SU19:** Building and construction work **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **SU2:** Mining, (including offshore industries) **SU23:** Electricity, steam, gas water supply and sewage treatment
Product category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **ES 5.:** Use of substance in non-spraying formulations. **PC1:** Adhesives, sealants **PC9a:** Coatings and paints, thinners, paint removers **PC12:** Fertilizers **PC19:** Intermediate **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products) **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **PC37:** Water treatment chemicals

Process category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **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) **PROC19:** Hand-mixing with intimate contact and only PPE available **ES 5.:** Use of substance in non-spraying formulations. **PROC1:** Use in closed process, no likelihood of exposure **PROC6:** Calendering operations **PROC10:** Roller application or brushing **PROC13:** Treatment of articles by dipping and pouring **PROC14:** Production of preparations or articles by tabletting, compression, extrusion, pelletisation **PROC15:** Use as laboratory reagent
Environmental release category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **ERC2:** Formulation of preparations **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles **ERC6b:** Industrial use of reactive processing aids **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **ES 5.:** Use of substance in non-spraying formulations. **ERC3:** Formulation in materials **ERC5:** Industrial use resulting in inclusion into or onto a matrix **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates) **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
ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release
ERC11a: Wide dispersive indoor use of long-life articles and materials with low release
ES 6.: Use as flocculant and coagulant in water and waste water treatment.
ERC8d: Wide dispersive outdoor use of processing aids in open systems

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated

differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC6

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated

differently).

Human factors not influenced by risk management

Exposed skin area	:	960 cm³

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Assumes no LEV (Local Exhaust Ventilation) except in laboratory.

Technical conditions and measures

Use long handled tools where possible.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC13

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	480 cm²

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently)., ECETOC TRA v3.0
Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Stay upwind/ keep distance from source.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC4, ERC6b, ERC8a, ERC8b, ERC8d

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing	Exposure	Specific	Value type	Level of	Risk

Scenario	Assessment Method	conditions		Exposure	characterisation ratio (PEC/PNEC):
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use, Professional use	Combined		0,217
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		0,113
PROC4	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,131
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,239
PROC5	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker -	1,646 mg/kg	0,433

			dermal, long-term - systemic	bw/day	
PROC5	ECETOC TRA	Industrial use	Combined		0,438
PROC8a	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC8a	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	1,645 mg/kg bw/day	0,433
PROC8a	ECETOC TRA	Industrial use	Combined		0,437
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,221
PROC9	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,113
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,3 mg/m³	0,022
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Industrial use	Combined		0,456
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,28
PROC14	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC14	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Industrial use	Combined		0,059
PROC15	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-	0,204 mg/kg bw/day	0,054

			term - systemic		
PROC15	ECETOC TRA	Industrial use	Combined		0,058
PROC19	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC19	RISKOFDERM	Industrial use, Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use, Professional use	Combined		0,376

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Solid, low dustiness, Professional use

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **SU5:** Manufacture of textiles, leather, fur **SU6b:** Manufacture of pulp, paper and paper products **ES 5.:** Use of substance in non-spraying formulations. **SU1:** Agriculture, forestry, fishery **SU7:** Printing and reproduction of recorded media **SU13:** Manufacture of other non-metallic mineral products, e.g. plasters, cement **SU19:** Building and construction work **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **SU2:** Mining, (including offshore industries) **SU23:** Electricity, steam, gas water supply and sewage treatment
Product category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **ES 5.:** Use of substance in non-spraying formulations. **PC1:** Adhesives, sealants **PC9a:** Coatings and paints, thinners, paint removers **PC12:** Fertilizers **PC19:** Intermediate **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products) **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **PC37:** Water treatment chemicals

Process category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **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) **PROC19:** Hand-mixing with intimate contact and only PPE available **ES 5.:** Use of substance in non-spraying formulations. **PROC1:** Use in closed process, no likelihood of exposure **PROC6:** Calendering operations **PROC10:** Roller application or brushing **PROC13:** Treatment of articles by dipping and pouring **PROC14:** Production of preparations or articles by tabletting, compression, extrusion, pelletisation **PROC15:** Use as laboratory reagent
Environmental release category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **ERC2:** Formulation of preparations **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles **ERC6b:** Industrial use of reactive processing aids **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **ES 5.:** Use of substance in non-spraying formulations. **ERC3:** Formulation in materials **ERC5:** Industrial use resulting in inclusion into or onto a matrix **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates) **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
ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release
ERC11a: Wide dispersive indoor use of long-life articles and materials with low release
ES 6.: Use as flocculant and coagulant in water and waste water treatment.
ERC8d: Wide dispersive outdoor use of processing aids in open systems

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated

differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3

Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC6

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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
Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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
Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	960 cm^3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Assumes no LEV (Local Exhaust Ventilation) except in laboratory.

Technical conditions and measures

Use long handled tools where possible.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC13

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently)., ECETOC TRA v3.0
Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Stay upwind/ keep distance from source.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC4, ERC6b, ERC8a, ERC8b, ERC8d

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.
Remarks	:	As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,006 mg/m³	< 0,01
PROC2	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use, Professional use	Combined		0,217
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC3	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use, Professional use	Combined		0,113
PROC4	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,6 mg/m³	0,045
PROC4	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Professional use	Combined		0,153
PROC5	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,12 mg/m³	< 0,01
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	1,645 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Professional use	Combined		0,442
PROC5	ECETOC TRA	Professional	Worker -	0,6 mg/m³	0,045

		use	inhalative, long-term - systemic		
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Professional use	Combined		0,478
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8a	ECETOC TRA	Industrial use, Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use, Professional use	Combined		0,239
PROC8b	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC8b	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Professional use	Combined		0,239
PROC9	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC9	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Professional use	Combined		0,131
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,3 mg/m³	0,022
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Industrial use	Combined		0,456
PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,3 mg/m³	< 0,01
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Professional use	Combined		0,239
PROC14	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,6 mg/m³	0,045

PROC14	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Professional use	Combined		0,099
PROC15	ECETOC TRA	Industrial use	Worker - inhalative, long-term - systemic	0,06 mg/m³	< 0,01
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,058
PROC19	ECETOC TRA	Industrial use, Professional use	Worker - inhalative, long-term - systemic	0,3 mg/m³	0,022
PROC19	RISKOFDERM	Industrial use, Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use, Professional use	Combined		0,376

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Industrial use

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **SU5:** Manufacture of textiles, leather, fur **SU6b:** Manufacture of pulp, paper and paper products **ES 5.:** Use of substance in non-spraying formulations. **SU1:** Agriculture, forestry, fishery **SU7:** Printing and reproduction of recorded media **SU13:** Manufacture of other non-metallic mineral products, e.g. plasters, cement **SU19:** Building and construction work **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **SU2:** Mining, (including offshore industries) **SU23:** Electricity, steam, gas water supply and sewage treatment
Product category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **ES 5.:** Use of substance in non-spraying formulations. **PC1:** Adhesives, sealants **PC9a:** Coatings and paints, thinners, paint removers **PC12:** Fertilizers **PC19:** Intermediate **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products) **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **PC37:** Water treatment chemicals

Process category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **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) **PROC19:** Hand-mixing with intimate contact and only PPE available **ES 5.:** Use of substance in non-spraying formulations. **PROC1:** Use in closed process, no likelihood of exposure **PROC6:** Calendering operations **PROC10:** Roller application or brushing **PROC13:** Treatment of articles by dipping and pouring **PROC14:** Production of preparations or articles by tabletting, compression, extrusion, pelletisation **PROC15:** Use as laboratory reagent
Environmental release category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **ERC2:** Formulation of preparations **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles **ERC6b:** Industrial use of reactive processing aids **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **ES 5.:** Use of substance in non-spraying formulations. **ERC3:** Formulation in materials **ERC5:** Industrial use resulting in inclusion into or onto a matrix **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates) **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
ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release
ERC11a: Wide dispersive indoor use of long-life articles and materials with low release
ES 6.: Use as flocculant and coagulant in water and waste water treatment.
ERC8d: Wide dispersive outdoor use of processing aids in open systems

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measures identified.

Conditions and measures related to personal protection, hygiene and health evaluation

Produced in a closed system, and during working procedures, exposure to this substance is possible only in case of leaks.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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
Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC6

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use
Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure
Clean equipment and the work area every day., Clear spills immediately.
Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	960 cm^3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Effective exhaust ventilation system

Technical conditions and measures

Use long handled tools where possible.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC13

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Stay upwind/keep distance from source.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training., Wear respiratory protection., (APF, Assigned Protection Factor = 10) (Effectiveness: 90 %)

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of

the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC4, ERC6b, ERC8a, ERC8b, ERC8d

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in

most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC1	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC1	ECETOC TRA	Industrial use	Combined		0,012
PROC2	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC2	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use	Combined		0,28
PROC3	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC3	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use	Combined		0,173
PROC4	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-	0,823 mg/kg bw/day	0,216

			term - systemic		
PROC5	ECETOC TRA	Industrial use	Combined		0,28
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,217
PROC5	ECETOC TRA	Industrial use	Combined		0,28
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,171 mg/m³	0,013
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,229
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,28
PROC9	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Industrial use	Combined		0,440
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,06 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,221
PROC14	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC14	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Industrial use	Combined		0,118
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker -	0,204 mg/kg	0,054

			dermal, long-term - systemic	bw/day	
PROC15	ECETOC TRA	Industrial use	Combined		0,118
PROC19	ECETOC TRA	Industrial use	Worker - inhalative	1,711 mg/m³	0,128
PROC19	RISKOFDERM	Industrial use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,354
PROC19	ECETOC TRA	Industrial use	Combined		0,481

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 5., Use of substance in non-spraying formulations., ES 6., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Professional use

Main User Groups	:	**SU 22:** Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Sector of use	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **SU5:** Manufacture of textiles, leather, fur **SU6b:** Manufacture of pulp, paper and paper products **ES 5.:** Use of substance in non-spraying formulations. **SU1:** Agriculture, forestry, fishery **SU7:** Printing and reproduction of recorded media **SU13:** Manufacture of other non-metallic mineral products, e.g. plasters, cement **SU19:** Building and construction work **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **SU2:** Mining, (including offshore industries) **SU23:** Electricity, steam, gas water supply and sewage treatment
Product category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC21:** Laboratory chemicals **ES 5.:** Use of substance in non-spraying formulations. **PC1:** Adhesives, sealants **PC9a:** Coatings and paints, thinners, paint removers **PC12:** Fertilizers **PC19:** Intermediate **PC23:** Leather tanning, dye, finishing, impregnation and care products **PC26:** Paper and board dye, finishing and impregnation products: including bleaches and other processing aids **PC34:** Textile dyes, finishing and impregnating products; including bleaches and other processing aids **PC35:** Washing and cleaning products (including solvent based products) **ES 6.:** Use as flocculant and coagulant in water and waste water treatment. **PC37:** Water treatment chemicals

Process category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **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) **PROC19:** Hand-mixing with intimate contact and only PPE available **ES 5.:** Use of substance in non-spraying formulations. **PROC1:** Use in closed process, no likelihood of exposure **PROC6:** Calendering operations **PROC10:** Roller application or brushing **PROC13:** Treatment of articles by dipping and pouring **PROC14:** Production of preparations or articles by tabletting, compression, extrusion, pelletisation **PROC15:** Use as laboratory reagent
Environmental release category	:	**ES 5. & ES 6.:** Use of substance in non-spraying formulations & use as flocculant and coagulant in water and waste water treatment. **ERC2:** Formulation of preparations **ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles **ERC6b:** Industrial use of reactive processing aids **ERC8a:** Wide dispersive indoor use of processing aids in open systems **ERC8b:** Wide dispersive indoor use of reactive substances in open systems **ES 5.:** Use of substance in non-spraying formulations. **ERC3:** Formulation in materials **ERC5:** Industrial use resulting in inclusion into or onto a matrix **ERC6a:** Industrial use resulting in manufacture of another substance (use of intermediates) **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
ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release
ERC11a: Wide dispersive indoor use of long-life articles and materials with low release
ES 6.: Use as flocculant and coagulant in water and waste water treatment.
ERC8d: Wide dispersive outdoor use of processing aids in open systems

2.2 Contributing scenario controlling worker exposure for: PROC1

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor use
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

No specific measures identified.

Conditions and measures related to personal protection, hygiene and health evaluation

Produced in a closed system, and during working procedures, exposure to this substance is possible only in case of leaks.

2.2 Contributing scenario controlling worker exposure for: PROC2

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use of substance in closed process, Clear transfer lines prior to de-coupling.

Organisational measures to prevent /limit releases, dispersion and exposure

Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC3

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Use of substance in closed process, Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure
Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation
Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC4

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures
Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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
Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with ‘basic’ employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC5

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).

Physical Form (at time of use) : Aqueous solution

Frequency and duration of use

Human factors not influenced by risk management

Exposed skin area : Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Temperature : 40 °C
Ventilation rate per hour : 1 - 3
Remarks : Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC6

Product characteristics

Concentration of the Substance in Mixture/Article : Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use) : Aqueous solution

Frequency and duration of use

Remarks : Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area : Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor
Temperature : 40 °C
Ventilation rate per hour : 3 - 5
Remarks : Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 95 %)

2.2 Contributing scenario controlling worker exposure for: PROC8a

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC8b

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Both hands (960 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance., Use drum pumps.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC9

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Use bulk or semi-bulk handling systems., Discharge sacks via suitable vented charge chute., Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with

'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC10

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	960 cm^3

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented., Effective exhaust ventilation system

Technical conditions and measures

Use long handled tools where possible.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately., Avoid splashing.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC13

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	480 cm^2

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC14

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palms of both hands (480 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection., Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.2 Contributing scenario controlling worker exposure for: PROC19

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	< 2 kg/min
Remarks	:	Riskofderm 2.0

Frequency and duration of use

Remarks	:	More than rare contact., (, Riskofderm 2.0,)

Human factors not influenced by risk management

Remarks	:	More than light contact., Significant amounts of aerosols or splashes (dermal)., Riskofderm 2.0

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes no LEV (Local Exhaust Ventilation) except in laboratory., Assumes a good basic standard of occupational hygiene is implemented.

Organisational measures to prevent /limit releases, dispersion and exposure

Clean equipment and the work area every day., Clear spills immediately.

Conditions and measures related to personal protection, hygiene and health evaluation

Use suitable eye protection.Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Effectiveness: 90 %)Wear respiratory protection., (APF, Assigned Protection Factor = 20) (Effectiveness: 95 %)

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC3, ERC4, ERC5, ERC6a, ERC6b, ERC8a, ERC8b, ERC8c, ERC8f, ERC10a, ERC11a

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

Amount used	:	
Remarks	:	Not relevant

Technical conditions and measures / Organizational measures

Remarks	:	Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.
Remarks	:	Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in

most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

2.1 Contributing scenario controlling environmental exposure for: ERC2, ERC4, ERC6b, ERC8a, ERC8b, ERC8d

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic

life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	Risk characterisation ratio (PEC/PNEC):
PROC1	ECETOC TRA	Industrial use	Worker - inhalative	0,086 mg/m³	< 0,01
PROC1	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,02 mg/kg bw/day	< 0,01
PROC1	ECETOC TRA	Industrial use	Combined		0,012
PROC2	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC2	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,822 mg/kg bw/day	0,216
PROC2	ECETOC TRA	Industrial use	Combined		0,28
PROC3	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC3	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,414 mg/kg bw/day	0,109
PROC3	ECETOC TRA	Industrial use	Combined		0,173
PROC4	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC4	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC4	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,042 mg/m³	< 0,01
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,179
PROC5	ECETOC TRA	Professional use	Combined		0,181

PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,599 mg/m³	0,045
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Professional use	Combined		0,478
PROC8a	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8a	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8a	ECETOC TRA	Industrial use	Combined		0,28
PROC8b	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC8b	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC8b	ECETOC TRA	Industrial use	Combined		0,28
PROC9	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC9	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,412 mg/kg bw/day	0,108
PROC9	ECETOC TRA	Industrial use	Combined		0,172
PROC5	ECETOC TRA	Professional use	Worker - inhalative	0,171 mg/m³	0,013
PROC5	ECETOC TRA	Professional use	Worker - dermal, long-term - systemic	1,646 mg/kg bw/day	0,433
PROC5	ECETOC TRA	Professional use	Combined		0,446
PROC5	ECETOC TRA	Industrial use	Worker - inhalative	0,06 mg/m³	< 0,01
PROC5	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,823 mg/kg bw/day	0,216
PROC5	ECETOC TRA	Industrial use	Combined		0,221
PROC14	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC14	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,206 mg/kg bw/day	0,054
PROC14	ECETOC TRA	Industrial use	Combined		0,118
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-	0,204 mg/kg bw/day	0,054

			term - systemic		
PROC15	ECETOC TRA	Industrial use	Combined		0,118
PROC19	ECETOC TRA	Professional use	Worker - inhalative	0,365 mg/m³	0,022
PROC19	RISKOFDERM	Professional use	Worker - dermal, long-term - systemic	1,344 mg/kg bw/day	0,292
PROC19	ECETOC TRA	Professional use	Combined		0,314

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 7., Use as a laboratory chemical (industrial), Use as a laboratory chemical (professional), Solid, low dustiness

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU9:** Manufacture of fine chemicals
Product category	:	**PC21:** Laboratory chemicals
Process category	:	**PROC15:** Use as laboratory reagent
Environmental release category	:	**ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Solid, low dustiness

Amount used

: 0,05 kg

Frequency and duration of use

Frequency of use : 28 days/year

Human factors not influenced by risk management

Exposed skin area : Both hands and forearms (1900 cm^2)

Other operational conditions affecting workers exposure

Outdoor / Indoor : Indoor

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.1 Contributing scenario controlling environmental exposure for: ERC4

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing Scenario	Exposure Assessment	Specific conditions	Value type	Level of Exposure	Risk characterisation

	Method				ratio (PEC/PNEC):
PROC15	ECETOC TRA	Professional use	Worker - inhalative, long-term - systemic	0,00092 mg/m³	< 0,01
PROC15	Consexpo	Professional use	Worker - dermal, long-term - systemic	0,008 mg/kg bw/day	< 0,004
PROC15	Consexpo	Professional use	Consumer - oral, long-term - systemic	0 mg/kg bw/day	< 0,01
PROC15		Professional use	Combined		< 0,01

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 7., Use as a laboratory chemical (industrial), Use as a laboratory chemical (professional), Aqueous solution

Main User Groups	:	**SU 3:** Industrial uses: Uses of substances as such or in preparations at industrial sites
Sector of use	:	**SU9:** Manufacture of fine chemicals
Product category	:	**PC21:** Laboratory chemicals
Process category	:	**PROC15:** Use as laboratory reagent
Environmental release category	:	**ERC4:** Industrial use of processing aids in processes and products, not becoming part of articles

2.2 Contributing scenario controlling worker exposure for: PROC15

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Frequency and duration of use

Remarks	:	Covers daily exposures up to 8 hours (unless stated differently).

Human factors not influenced by risk management

Exposed skin area	:	Palm of one hand (240 cm²)

Other operational conditions affecting workers exposure

Outdoor / Indoor	:	Indoor
Temperature	:	40 °C
Ventilation rate per hour	:	1 - 3
Remarks	:	Assumes a good basic standard of occupational hygiene is implemented.

Technical conditions and measures

Drain down and flush system prior to equipment opening or maintenance.

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

Use suitable eye protection.

2.1 Contributing scenario controlling environmental exposure for: ERC4

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

Amount used :

Remarks : Not relevant

Technical conditions and measures / Organizational measures

Remarks : Aluminum, aluminum powders, aluminum oxide and soluble aluminum compounds are non-hazardous (not classified for the environment). Aluminum (Al) is the most commonly occurring metallic element, comprising eight percent of the earth's crust and is therefore found in great abundance in both the terrestrial and sediment environments. Concentrations of 3-8% (30,000-80,000 ppm) are not uncommon. The relative contributions of anthropogenic aluminum to the existing natural pools of aluminum in soils and sediments is very small, and therefore, not relevant either in terms of added amounts or in terms of toxicity.

Remarks : Aluminum ions released to surface waters quickly form insoluble aluminum hydroxides in mixing zones. Formation of the complex hydroxide causes the aluminum to drop out of solution very rapidly in neutral and alkaline waters. The dissolved natural background concentrations of aluminum, in most cases, are at equilibrium therefore an addition of aluminum would lead to the precipitation of aluminum compounds from solution and not result in effects to aquatic life.

Remarks : As no environmental hazard was identified no environmental-related exposure assessment and risk characterization was performed.

3. Exposure estimation and reference to its source

Workers

Contributing	Exposure	Specific	Value type	Level of	Risk

Scenario	Assessment Method	conditions		Exposure	characterisation ratio (PEC/PNEC):
PROC15	ECETOC TRA	Industrial use	Worker - inhalative	0,855 mg/m³	0,064
PROC15	ECETOC TRA	Industrial use	Worker - dermal, long-term - systemic	0,204 mg/kg bw/day	0,054
PROC15	ECETOC TRA	Industrial use	Combined		0,118

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.

1. Short title of Exposure Scenario: ES 8., Use as flocculant and coagulant in water and waste water treatment., Aqueous solution, Consumer use

Main User Groups	:	**SU 21:** Consumer uses: Private households (= general public = consumers)
Sector of use	:	**SU1:** Agriculture, forestry, fishery **SU13:** Manufacture of other non-metallic mineral products, e.g. plasters, cement **SU19:** Building and construction work **SU23:** Electricity, steam, gas water supply and sewage treatment **SU21:** Private households (=general public = consumers)
Product category	:	**PC12:** Fertilizers **PC20:** Products such as pH-regulators, flocculants, precipitants, neutralization agents **PC35:** Washing and cleaning products (including solvent based products) **PC37:** Water treatment chemicals **PC19:** Intermediate **PC39:** Cosmetics, personal care products
Environmental release category	:	**ERC8a:** Wide dispersive indoor use of processing aids in open systems **ERC8f:** Wide dispersive outdoor use resulting in inclusion into or onto a matrix **ERC10a:** Wide dispersive outdoor use of long-life articles and materials with low release **ERC11a:** Wide dispersive indoor use of long-life articles and materials with low release

2.2 Contributing scenario controlling consumer exposure for: PC20

Product characteristics

Concentration of the Substance in Mixture/Article		Covers the percentage of the substance in the product up to 100 % (unless stated differently).
Physical Form (at time of use)	:	Aqueous solution

Amount used

	:	0,05 kg

Frequency and duration of use

Frequency of use	:	1 event/day
Remarks	:	ECETOC TRA

Frequency of use : 28 event(s)/year
Remarks : ConsExpo (v4.1)

Human factors not influenced by risk management
Exposed skin area : Both hands and forearms (1900 cm²)

Conditions and measures related to protection of consumer (e.g. behavioural advice, personal protection and hygiene)
Consumer Measures : Eye protection: If splashes are likely to occur, wear tightly fitting chemical resistant safety goggles, face–shield.

2.1 Contributing scenario controlling environmental exposure for: ERC8a, ERC8f, ERC10a, ERC11a

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
Amount used :
Remarks : Not relevant

3. Exposure estimation and reference to its source

Consumers

Contributing Scenario	Exposure Assessment Method	Specific conditions	Value type	Level of Exposure	RCR
PC20	ECETOC TRA	Consumers	Consumer - inhalative, long-term - systemic	0,128 mg/m³	0,039
PC20	ConsExpo (v4.1)	Consumers	Consumer - dermal, long-term - systemic	0,019 mg/kg bw/day	< 0,01
PC20	ConsExpo (v4.1)	Consumers	Consumer - oral, long-term -	0 mg/kg bw/day	< 0,01

			systemic		
PC20		Consumers	Combined		< 0,039

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

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

Worker exposure for this scenario has been assessed using ECETOC TRA V3.0.