SAFETY DATA SHEET
In accordance with Regulation (EC) 1907/2006 (REACH), Annex II

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY	
1.1 Product identifier	
Trade name:	**FLOMAR 200 –18%**
Other names:	PAC
Chemical name:	**ALLUMINIUM CHLORIDE, BASIC**
EC number:	215-477-2
CAS number:	1327-41-9
REACH registration n:	01-2119531563-43-XXXX
1.2 Relevant identified uses of the substance or mixture and uses advised against	
Uses: **(see corresponding ES as attachement to this SDS)**	Manufacture of the substance Formulation and Distribution Use in synthesis and as Intermediate Use in spraying Formulations Use in non-spraying Formulations Use as flocculant or coagulant in water and waste water treatment
Uses advised against:	None known
1.3 Details of the supplier of the safety data sheet	
Manufacturer/Importer/Supplier:	Marchi Industriale Spa – Via Trento, 16 – 50139 Firenze (FI) Tel +39 055475547, fax +39 055496626
Person responsible for the Safety Data Sheet (with e-mail address)	laboratorio@marchi-industriale.it
1.4 Emergency telephone number (h24)	

CAV "Osp. Bambino Gesù"	Rome	Piazza Sant'Onofrio, 4	06 68593726
Az. Osp. Univ. Foggia	Foggia	V.le Luigi Pinto, 1	800183459
Az. Osp. "A. Cardarelli"	Naples	Via A. Cardarelli, 9	081-7472870
CAV Policlinico "Umberto I"	Rome	V.le del Policlinico, 155	06-49978000
CAV Policlinico "A. Gemelli"	Rome	Largo Agostino Gemelli, 8	06-3054343
Az. Osp. "Careggi" U.O.	Florence	Largo Brambilla, 3	055-7947819
CAV	Pavia	Via Salvatore Maugeri, 10	0382-24444
Osp. Niguarda Ca' Granda	Milan	Piazza Ospedale Maggiore,3	02-66101029
Azienda Ospedaliera Papa Giovanni XXII	Bergamo	Piazza OMS, 1	800883300

2. HAZARDS IDENTIFICATION		
2.1 Classification of the substance		
Classification in accordance with Regulation 1272/2008 (CLP)		
Hazard statement(s):	H318: Causes serious eye damage H290: May be corrosive to metals	Eye Damage 1 Met. Corr. 1
2.1.3 Additional information		
2.2 Label elements		
Labelling in accordance with Regulation 1272/2008 (CLP)		
Hazard pictogram(s):		
Signal word	Danger	
Hazard statement(s):	H318 H290	Causes serious eye damage. May be corrosive to metals.
Precautionary statement(s):	P261: Avoid breathing dust/fume/gas/mist/vapours/spray. P264: Wash skin thoroughly after handling. P280: Wear protective gloves/protective clothing/eye protection/face protection. 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 doctor/physician. P406: Store in corrosive resistant/container with a resistant inner liner	
2.3 Other hazards		

PBT/vPvB criteria:	According to Annex XIII of Regulation (EC) No 1907/2006, no PBT and vPvB assessment has been conducted since the substance is inorganic.
Other hazards:	None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances

According to the REACH Regulation the product is a mono-constituent.

Chemical name	CAS no.	EC no.	IUPAC name	Purity
Aluminum chloride	1327-41-9	215-477-2	Aluminum chloride, basic	>>80% <99% (aqueous solution)

4. FIRST-AID MEASURES

4.1 Description of first aid measures

Eye contact:	Immediately wash eyes with plenty of running water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses, if present and easy to do. Seek medical advice if irritation develops and persists.
Skin contact:	Wash affected skin area with plenty of water and soap for at least 15 minutes thoroughly while removing contaminated clothing and shoes. Seek medical advice if irritation develops and persists.
Ingestion:	Seek medical advice if the victim feels unwell. Wash out mouth with plenty of water and give plenty of water to drink. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation:	Remove the victim from exposure into fresh air immediately if adverse effects (e.g. dizziness, drowsiness or respiratory irritation) occur. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid. Also seek medical advice if cough or other symptoms appear. Do not use mouth-to-mouth respiration. Seek medical advice immediately when vapors are intensively inhaled.

4.2 Most important symptoms and effects

Symptoms	Corrosive to the eyes
Risks	Causes severe eye damage. May be corrosive to metals.

4.3 Indication of any immediate medical attention and special treatment needed

Remove/Take off immediately all contaminated clothing. Rinse skin/eyes with water/shower. Move out of dangerous area

5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable:	All media
Not suitable:	No unsuitable extinguishing media known

5.2 Special hazards arising from the substance or mixture

Product is nonflammable and does not support combustion.
Move away from container and cool with water from a protected position.
The product reacts with most metals producing explosive hydrogen gas and hydrogen chloride.
Hydrogen chloride is readily dissociated in water into hydrated protons and chloride ion

5.3 Advice for firefighters

In case of insufficient ventilation wear suitable respiratory equipment
Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.
Absorb with inert, damp, non-combustible material, then flush area with water. Collect spillage in containers, seal securely and deliver for disposal according to local regulations.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

For personal protection see section 8.
Use personal protective equipment.
Ensure adequate ventilation

6.2 Environmental precautions

Spillages or uncontrolled discharges into watercourses must be IMMEDIATELY alerted to the Environmental Agency or other appropriate regulatory body.
Absorb with inert, damp, non-combustible material, then flush area with water. Collect spillage in containers, seal securely and deliver for disposal according to local regulations

6.3 Methods and material for containment and cleaning up

Neutralize large spillages with lime or soda ash. Rinse remnant with plenty of water.
Refer to section 13 for disposal of spilled material.

6.4 Reference to other sections

See section 8 for personal protective equipment and section 13 for waste disposal

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Technical measures/ Precautions:	For personal protection see section 8. The usual precautions for handling chemicals should be observed. Avoid any direct contact with the material and formation of aerosol. Do not breathe gas/fumes/ vapor/spray and avoid contact with skin and eyes. Smoking, eating and drinking should be prohibited in the application area. Product is nonflammable and does not support combustion.
General occupation hygiene:	Do not to eat, drink and smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/ Storage conditions:	No smoking. Keep in a well-ventilated place. Do not store together with alkalies and oxidants. Keep container tightly closed. Store in plastic tanks Eye wash facilities and emergency shower must be available when handling this product For safety, store below: 35 °C
Incompatible products:	Use only metal containers with acid resistand innerlayers, product may be corrosive to metals.

7.3 Specific end use

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Regulated occupational exposure limit values:

Components	Value	Control parameters	Form of exposure
Aluminum chloride	TWA	2 mg/m³	Powder inhalation

Recommended occupational and consumer exposure limit values (following from the performed CSA):

Exposure model	DNEL
	Long term (8 h) workers
Inhalation	16,4 mg/m³
Dermal	4,6 mg/kg bw day
	Long term general population
Ihalation	4 mg/m³
Dermal	2,32 mg/kg bw/day
Oral	2,3 mg/kg bw/day
	PNEC
Marine water	0,03 µg/L
Fresh water	0,3 µg/L

8.2 Exposure controls

Appropriate engineering controls:	Effective exhaust ventilation system Ensure that eyewash stations and safety showers are close to the workstation location.
Environmental exposure controls:	Dispose of rinse water in accordance with local and national regulations.
Individual protection measures, such as personal protective equipment	
Respiratory protection:	Provide extract ventilation to material transfer points and other openings. Carry out in a vented booth provided with laminar airflow. Automate activity where possible. Wear acid vapour mask
Hand protection:	Wear suitable gloves tested to EN374 (e.g. PVC or rubber gloves)
Eye protection:	Use safety eyewear designed to protect against splash of liquids. Tightly fitting safety goggles.
Skin and body protection:	Protective suit, apron and boots. Choose body protection according to the amount and concentration of substance at the work place

Hygiene measures:	Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday. Plan first aid action before beginning work with this product.
General advice Air Soil Water	Do not flush into surface water or sanitary sewer system. Do not flush into surface water or sanitary sewer system. Hose down gases, fumes and/or dust with water. Avoid subsoil penetration. Do not let product enter drains.
9. PHYSICAL AND CHEMICAL PROPERTIES	
9.1 Information on basic physical and chemical properties	
Appearance:	Colourless to light yellow, liquid
Odour:	insignificant
pH (5% in water) 20°C	2 ÷ 5
Melting/Freezing temperature:	ca – 11°C
Boiling temperature:	ca 115°C
Flash-point:	Not relevant as the substance is an inorganic solid.
Flammability:	Non flammable (based on molecular structure)
Explosive properties:	Not explosive
Oxidizing properties:	Not oxidising
Vapour pressure:	21 mBar
Relative density (D4 (20)):	Ca 1400 kg/m³ (20 °C)
Solubility in water:	Completely miscible at ca. 20 °C
Partition coefficient n-octanol/water:	Not relevant as the substance is inorganic, but considered to be low (based on high water solubility)
Viscosity:	Damic: ca. 50 cP at ca. 20 °C
9.2 Other information None known	
10. STABILITY AND REACTIVITY	
10.1 Reactivity Stable under recommended storage and handling conditions (see section 7, handling and storage).	
10.2 Chemical stability Reaction with strong oxidising agents. Reaction with alkaline substances (bases).	
10.3 Possibility of hazardous reactions The product reacts with metals with evolution of highly flammable hydrogen. The acid reacts violent with alkalies with evolution of heat.	
10.4 Conditions to avoid Any use involving aerosol formation or vapor release in excess of 10 ppm where workers are exposed without respiratory protection Any use carrying a risk of splashes to eyes / skin where workers are exposed without eye/skin protection	
10.5 Incompatible materials Metals	
10.6 Hazardous decomposition products Hydrogen chloride / Chlorine / Hydrogen.	
11. TOXICOLOGICAL INFORMATION	
11.1 Information on toxicological effects	
ACUTE TOXICITY	
Acute oral toxicity:	Rat Oral LD50 >2000 mg/kg (Hofmann 1988)
Acute dermal toxicity:	Rat Oral LD50 >2000 mg/kg
Acute inhalation toxicity:	Toxic signs in rat during exposure to PAC gas or aerosol were essentially identical. aerosol LC50 (rat – 4 hours exposure): 5 mg/L
LOCAL EFFECTS	
Skin irritation:	Corrosive. Studies with results indicating corrosivity to the skin
Eye irritation:	Corrosive based on skin corrosivity data
Skin sensitization:	Not sensitizing (OECD 406)
OTHER	

Repeated dose toxicity	**Oral:** rat NOAEL 1000 mg/kg bw/day. **Dermal:** No data available from repeated dose dermal studies with hydrogen chloride. **Inhalation:** Sub-chronic inhalation NOAEC is 15,3 mg/m^3 for rats/mice
Aspiration toxicity	Corrosive to the respiratory tract.
Mutagenicity:	Not mutagenic, not clastogenic
Carcinogenicity:	No data available
12. ECOLOGICAL INFORMATION	
12.1 Toxicity	
It is accepted that the aquatic toxicity of acids results if sufficient acid is present to produce a very low pH (i. e. pH 3-5). Given that the environmental exposure assessment shows insignificant perturbation of aquatic pH levels from the formulation of the product and its proposed use, it is considered that there is no long-term risk to aquatic organisms and therefore chronic fish effects data are not required.	
Fish (short-term):	96-h LC_{50}: 1,39 mg/l (pH 4,2-8,2 - static)
Fish (long-term):	28 days LC_{50}: 0,019 mg/l (pH 5,8-5,9) (aluminium sulphate)
Daphnia magna (short-term):	48-h EC_{50}: 0,214-1,26 mg/l (pH 5,1-8,0 - static)
Daphnia magna (long-term):	No data available
Algae:	96-h EC_{10}: 0,084 mg/l (pH 5 - static)
Inhibition of microbial activity:	2-h EC_{10}: >200 mg/l (static)
12.2 Persistence and degradability	
Biodegradation:	As the active substance is an inorganic compound, which is not biologically degradable, the ready biodegradability, inherent biodegradability and biodegradation in seawater are scientifically impossible to perform.
Hydrolysis:	Due to its intrinsic properties, it is scientifically impossible to perform a hydrolysis test.
12.3 Bioaccumulative potential	
Bioconcentration factor (BCF):	No bioaccumulation expected.
12.4 Mobility in soil	
Adsorption coefficient:	Terrestrial compartment is not expected to be relevant. If emitted to soil, adsorption to soil particles will be negligible. Depending on the buffer capacity of the soil, H^+ will be neutralized in the soil pore water by natural organic or inorganic matter or the pH may decrease.
12.5 Results of PBT and vPvB assessment PAC does not fulfil all criteria to be classified as a PBT or vPvB substance	
13. DISPOSAL CONSIDERATIONS	
Waste from residues:	Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Hazardous waste Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. All contaminated waste water must be processed in an industrial or municipal wastewater treatment plant that incorporates both primary and secondary treatments Site should have a spill plan to ensure that adequate safeguards are in place to minimize the impact of episodic released.
Container:	Empty remaining contents. Contaminated packaging According to local regulations
14. TRANSPORT INFORMATION	

14.1. UN number
3264
14.2. UN proper shipping name
ALUMINIUM CHLORIDE SOLUTION
14.3. Transport hazard class(es)
Class : 8
Label : 8
Kemler Number: 80
Tunnel restriction code : E
Limited quantities : 5 L
EmS : F-A, S-B
14.4. Packing group
III
14.5. Environmental hazards
Product is not environmentally hazardous
Marine polluting agent : Not
14.6. Special precautions for user
No data available.
14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
It is not intended to carry bulk

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture:	
15.2 Chemical safety assessment:	Chemical Safety Assessments have been carried out for these substances.

16. OTHER 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 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 proceed, unless specified in the text.

Version:	2.1
Creation date:	December, 2nd 2019
Release info:	This version replaces all previous documents
Created/Revised by:	SILC FERTILIZZANTI SRL – Via delle Acque, 43 – 48124 Ravenna

ANNEX
Exposure scenario 1: Manufacture of the substance

Aqueous solution:

ES1 - Manufacture of Aluminium salts – Aqueous solution – max Aluminium content = 25%	
Section 1	**Exposure Scenario Title**
Title	**Manufacture of Aluminium salts - aqueous solution; Aluminium content = max. 25%**
Use Descriptor	Sector of Use: Industrial (SU8, SU9)
	Process Categories: PROC1: Use in a closed process, no likelihood of exposure PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a closed batch process (synthesis or formulation) PROC4: Use in a 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 a laboratory reagent
	Environmental Release Categories: ERC1: Manufacture of substances
Processes, tasks, activities covered	Manufacture of the substance. Includes recycling/ recovery, material transfers, storage, maintenance and loading (including marine vessel/barge, road/rail car and bulk container), sampling and associated laboratory activities
Exposure criteria	DNEL, inhalation long term: 1.8 mg/m³
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14]
Concentration of substance in product	Covers percentage substance in the product up to 25 % [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposures [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: **Use suitable eye protection [PPE26]** **Avoid skin contact: Wear suitable gloves tested to EN374 [PPE15]**	
PROC1: General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.*
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems)	No specific measures identified [EI18]. *Recommendations:*

[CS108]	*{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed}* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC4: General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}; {Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}* *{Clear spills immediately [C&H13]}.*
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators:

	- Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 2: Formulation and Distribution

Aqueous solution:

ES2 – Formulation and Distribution of Aluminium salts (aqueous solutions); Max. Aluminium content = 25%	
Section 1	**Exposure Scenario Title**
Title	**Formulation and Distribution of Aluminium salts (aqueous solutions); Max. Aluminium content = 25%**
Use Descriptors	Sector of Use: Industrial (SU10)
	Process Categories: PROC1: Use in a closed process, no likelihood of exposure PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a 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) PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletization PROC15: Use as a laboratory reagent PROC19: Hand-mixing with intimate contact and only PPE available
	Environmental Release Categories: ERC2: Formulation of preparations
Processes, tasks, activities covered	Adding Alu salts to liquid and solid formulations; includes distribution and associated laboratory activities (aqueous solutions, max Alu content = 25%). Distribution: loading and (re)packing of the substances.
GES exposure criteria	DNEL, inhalation long term: 1.8 mg/m3
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14].
Concentration of substance in product	Covers percentage substance in the product up to 25% [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*

Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposure [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: Use suitable eye protection [PPE26]. Avoid skin contact: wear suitable gloves tested to EN374 [PPE15]	
PROC1: General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.*
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.* *{Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed}* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC4: General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC5: General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC8a: General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*
PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*

PROC9: General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Clean equipment and the work area every day [C&H3]} {Clear spills immediately [C&H13]}.*
PROC14: General exposures (open systems) [CS16] Production or preparation or articles by tabletting, compression, extrusion or pelletisation [CS100]	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}* *{Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*
PROC19: General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].	**Industrial workers:** **5-25%:** Avoid carrying out operation for more than 1 hour [OC11] **<5%:** Avoid carrying out operation for more than 4 hours [OC12] **<1%:** No specific measures identified [EI18] **Professional workers:** **5-25%:** Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **Or:** Avoid carrying out operation for more than 15 minutes [OC10]{ **<5%:** Avoid carrying out operation for more than 1 hour [OC11] **<1%:** Avoid carrying out operation for more than 4 hours [OC12] *Recommendations:* *{Clean equipment and the work area every day [C&H3]}* *{Clear spills immediately [C&H13]}* *{Stay upwind/keep distance from source [EI22]}.*
Section 3	**Exposure Estimation**

3.1. Health
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]
3.2. Environment
N.A.

Section 4	**Guidance to check compliance with the Exposure Scenario**

4.1. Health
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]
4.2. Environment
N.A.

Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 3: Use in synthesis and as Intermediate

Aqueous solution:

ES3 – Use of Aluminium salts (aqueous solutions) in synthesis as a process chemical and as an intermediate; Max. Aluminium content = 25%	
Section 1	**Exposure Scenario Title**
Title	**Use of Aluminium salts (aqueous solutions) in synthesis as a process chemical and as an intermediate; Max. Aluminium content = 25%**
Use Descriptors	Sector of Use: SU6b, SU8, SU9, SU14
	Process Categories: PROC1: Use in a closed process, no likelihood of exposure PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a closed batch process (synthesis or formulation) PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC15: Use as a laboratory reagent
	Environmental Release Categories: ERC1: Manufacture of substances ERC2: Formulation of preparations ERC4: Industrial use 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
Processes, tasks, activities covered	Use of Aluminium salts (aqueous solutions) in synthesis as a process chemical and as an intermediate. Includes material transfers and associated laboratory activities. Max. Aluminium content = 25%
GES exposure criteria	DNEL, inhalation long term: 1.8 mg/m3

Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14].
Concentration of substance in product	Covers percentage substance in the product up to 25% [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposure [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: Use suitable eye protection [PPE26]. Avoid skin contact: wear suitable gloves tested to EN374 [PPE15]	
PROC1: General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.*
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.* *{Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed}* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC4: General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC8a: General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*

PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC9: General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&H3]} {Clear spills immediately [C&H13]}.*
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 4: Use in spraying Formulations

Aqueous solution:

ES4 – Industrial and Professional use of Aluminium salts in spraying formulations (aqueous solutions); Max. aluminium content = 25%

Section 1	Exposure Scenario Title
Title	**Industrial and Professional Use of Aluminium salts in spraying formulations (aqueous solutions) – Max. Aluminium content = 25%**
Use Descriptor	Sector of Use: Industrial (SU5, SU6b, SU7)
	Process Categories: PROC1: Use in a closed process, no likelihood of exposure PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a closed batch process (synthesis or formulation) PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) PROC7: Industrial spraying PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC11: Non industrial spraying PROC19: Hand-mixing with intimate contact and only PPE available
	Environmental Release Categories: ERC3: Formulation in materials ERC4: Industrial use ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC8a: Wide dispersive indoor use of processing aids in open systems 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
Processes, tasks, activities covered	Industrial and Professional use of Aluminium salts in spraying formulations (aqueous solutions, max Aluminium content = 25%). Includes equipment cleaning and maintenance.
GES exposure criteria	DNEL, inhalation long term: 1.8 mg/m3
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14].
Concentration of substance in product	Covers percentage substance in the product up to 25% [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1].

	Indoor [OC8]. Ensure operatives are trained to minimize exposure [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: **Use suitable eye protection [PPE26].** **Avoid skin contact: wear suitable gloves tested to EN374 [PPE15]**	
PROC1: General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.*
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.* *{Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed}* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC5: General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC7: General exposures [CS1]. Spraying [CS10].	**5-25%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (90% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (90% efficiency) [E70]. Wear a respirator conforming to EN140 with Type A/P2 filter or better {PPE29] **Or:** Avoid carrying out operation for more than 1 hour [OC11] Plus: Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **Or:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (90% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (90% efficiency) [E70]. Plus: Avoid carrying out operation for more than 1 hour [OC11] **<5%:** Avoid carrying out operation for more than 4 hours [OC12] Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **<1%:** Limit the substance content in the product to 1% [OC16].Avoid carrying out operation for more than 15 minutes [OC10]{ *Recommendations:* *{Clean equipment and the work area every day [C&H3]}* *{Clear spills immediately [C&H13]}.*

PROC8a: General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*
PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC9: General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Clean equipment and the work area every day [C&H3]} {Clear spills immediately [C&H13]}.*
PROC11: General exposures [CS1]. Spraying [CS10].	**5-25%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **Or:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. ; Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. Avoid carrying out operation for more than 15 minutes [OC10] **<5%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. Avoid carrying out operation for more than 1 hour [OC11] **<1%:** Avoid carrying out operation for more than 15 minutes [OC10] *Recommendations:* *{Clean equipment and the work area every day [C&H3]}* *{Clear spills immediately [C&H13]}.*

PROC19:
General exposures [CS1]. Mixing operations (open systems) [CS30].
Manual [CS34].
	Industrial workers:
	5-25%:
	Avoid carrying out operation for more than 1 hour [OC11]{
	<5%:
	Avoid carrying out operation for more than 4 hours [OC12]
	<1%:
	No specific measures identified [EI18]
	
	Professional workers:
	5-25%:
	Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]
	Or:
	Avoid carrying out operation for more than 15 minutes [OC10]{
	<5%:
	Avoid carrying out operation for more than 1 hour [OC11]
	<1%:
	Avoid carrying out operation for more than 4 hours [OC12]
	
	Recommendations:
	{Clean equipment and the work area every day [C&H3]}
	{Clear spills immediately [C&H13]}
	{Stay upwind/keep distance from source [EI22]}.

Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 5: Use in non-spraying Formulations

Aqueous solution:

Worker – ES5 – Industrial and Professional use of Aluminium salts in non-spraying formulations (aqueous solutions); Max. Aluminium content = 25%

Section 1	**Exposure Scenario Title**
Title	**Industrial and Professional Use of Aluminium salts in non-spraying formulations (aqueous solutions) – Max. Aluminium content = 25%**
Use Descriptor	Sector of Use: Industrial (SU1, SU5, SU6b, SU7, SU13, SU19)
	Process Categories: PROC1: Use in a closed process, no likelihood of exposure PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a 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) PROC6: Calendering operations PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) PROC10: Roller application or brushing PROC13: Treatment of articles by dipping and pouring PROC14: Production of preparations or articles by tabletting, compression, extrusion, pelletization PROC15: Use as a laboratory reagent PROC19: Hand-mixing with intimate contact and only PPE available
	Environmental Release Categories: ERC2: Formulation of preparations ERC3: Formulation in materials ERC4: Industrial use ERC5: Industrial use resulting in inclusion into or onto a matrix ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates) ERC6b: Industrial use of reactive processing aids ERC8a: Wide dispersive indoor use of processing aids in open systems 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
Processes, tasks, activities covered	Industrial and Professional use of Aluminium salts in non-spraying formulations (aqueous solutions, max Alu content = 25%). Includes equipment cleaning and maintenance.

GES exposure criteria	DNEL, inhalation long term: 1.8 mg/m3
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14].
Concentration of substance in product	Covers percentage substance in the product up to 25% [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20°C above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposure [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: Use suitable eye protection [PPE26]. Avoid skin contact: wear suitable gloves tested to EN374 [PPE15]	
PROC1: General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.*
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.* *{Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed}* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC4: General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC5: General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC6: General exposures (open systems) [CS16] Mixing operations (open systems) [CS30]. Material transfers [CS3]. ; Batch process [CS55]. ;	No specific measures identified [EI18]. *Recommendations:* *{Clean equipment and the work area every day [C&H3]}. ;* *{Clear spills immediately [C&H13]}.*

Cleaning [CS47].	
PROC8a: General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*
PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC9: General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Clean equipment and the work area every day [C&H3]} {Clear spills immediately [C&H13]}.*
PROC10: General exposures (open systems) [CS16]. Rolling, Brushing [CS51] Equipment cleaning and maintenance [CS39].	**Industrial workers:** **5-25%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. **Or:** Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **Or:** Avoid carrying out operation for more than 1 hour [OC11] **<5%:** Avoid carrying out operation for more than 4 hours [OC12] **<1%:** No specific measures identified [EI18] **Professional workers:** **5-25%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. Plus: Avoid carrying out operation for more than 1 hour [OC11] **Or:** Avoid carrying out operation for more than 4 hours [OC12] Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **<5%:** Avoid carrying out operation for more than 1 hour [OC11] **Or:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. **<1%:** Minimise exposure by partial enclosure of the operation or equipment and provide extract ventilation at openings (80% efficiency) [E60]. ; Apply within a vented cab supplied with filtered air under positive pressure and with a protection factor of >20 (80% efficiency) [E70]. *Recommendations:* *{Use long handled tools where possible [E50]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}* *{Avoid splashing [C&H15]}*

PROC13: General exposures, open systems [CS16]. Dipping, immersion and pouring [CS4]	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clean equipment and the work area every day [C&H3]}. ;* *{Clear spills immediately [C&H13]}.*
PROC14: General exposures (open systems) [CS16] Production or preparation or articles by tabletting, compression, extrusion or pelletisation [CS100]	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]} .{Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}* *{Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC19: General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].	**Industrial workers:** **5-25%:** Avoid carrying out operation for more than 1 hour [OC11] **<5%:** Avoid carrying out operation for more than 4 hours [OC12] **<1%:** No specific measures identified [EI18] **Professional workers:** **5-25%:** Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **Or:** Avoid carrying out operation for more than 15 minutes [OC10]{ **<5%:** Avoid carrying out operation for more than 1 hour [OC11] **<1%:** Avoid carrying out operation for more than 4 hours [OC12] *Recommendations:* *{Clean equipment and the work area every day [C&H3]}* *{Clear spills immediately [C&H13]}* *{Stay upwind/keep distance from source [EI22]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section 8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	

Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 6: Use as flocculant or coagulant in water and waste water treatment

ES6 - Industrial and Professional use of Aluminium salts in aqueous solutions (max. 25% Aluminium) as a flocculants or coagulant in water and waste water treatment	
Section 1	**Exposure Scenario Title**
Title	**Industrial and Professional use of Aluminium salts in aqueous solutions as a flocculants or coagulant in water and waste water treatment; max 25% Aluminium content.**
Use Descriptor	Sector of Use: Industrial (SU2, SU5, SU6b, SU10, SU23)
	Process Categories: PROC2: Use in a closed continuous process, with occasional controlled exposure PROC3: Use in a closed batch process (synthesis or formulation) PROC4: Use in a 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
	Environmental Release Categories: ERC2: Formulation of preparations ERC4: Industrial use of processing aids 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 ERC8d: Wide dispersive outdoor use of processing aids in open systems
Processes, tasks, activities covered	Industrial and Professional use of Aluminium salts as a flocculants or coagulant in water and waste water treatment; max 25% Aluminium content. Includes equipment cleaning and maintenance.

Exposure criteria	DNEL, inhalation long term: 1.8 mg/m³
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure <10 Pa [OC14]
Concentration of substance in product	Covers percentage substance in the product up to 25 % [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposures [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: Use suitable eye protection [PPE26] Avoid skin contact: Wear suitable gloves tested to EN374 [PPE15]	
PROC2: General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.* *{Clear spills immediately [C&H13]}.*
PROC3: General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Ensure the system is closed} ;* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.{Clear spills immediately [C&H13]}.*
PROC4: General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
PROC5: General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]};* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC8a: General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}.{Clear spills immediately [C&H13]}.*

PROC8b: General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Use drum pumps [E53]}. {Clean equipment and the work area every day [C&H3]}. {Clear spills immediately [C&H13]}.*
PROC9: General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&H3]} {Clear spills immediately [C&H13]}.*
PROC19: General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].	**Industrial worker:** **5-25%:** Avoid carrying out operation for more than 1 hour [OC11] **1-5%:** Avoid carrying out operation for more than 4 hours [OC12] **<1%:** No specific measures identified [EI18]. **Professional worker:** **5-25%:** Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] **or:** Avoid carrying out operation for more than 15 minutes [OC10]{ **1-5%:** Avoid carrying out operation for more than 1 hour [OC11] **<1%:** Avoid carrying out operation for more than 4 hours [OC12] *Recommendations:* *{Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}. {Stay upwind/keep distance from source [EI22]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	

Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Exposure Scenario 7: Use in laboratory

Aqueous solution:

ES7 – Use of Aluminium salts – Aqueous solution – in industrial and professional laboratory settings; max Aluminium content = 25%	
Section 1	**Exposure Scenario Title**
Title	**Use of Aluminium salts – Aqueous solution – in industrial and professional laboratory settings; max Aluminium content = 25%**
Use Descriptors	Sector of Use: SU9
	Process Categories: PROC15: Use as a laboratory reagent
	Environmental Release Categories: ERC4: Industrial use of processing aids in processes and products, not becoming part of articles
Processes, tasks, activities covered	Use of aluminium salts (aqueous solution) in small scale laboratory settings. Max. aluminium content = 25%
Exposure criteria	DNEL, inhalation long term: 1.8 mg/m³
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Aqueous solution: vapour pressure of Alu-salt in water 0.01 Pa or less; Liquid, vapour pressure < 10 Pa [OC14]
Concentration of substance in product	Covers percentage substance in the product up to 25 % [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15]; Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposures [EI19]
Contributing Scenarios	**Risk Management Measures**
Below pH2 and above pH11 the substance has corrosive properties: **Use suitable eye protection [PPE26]** **Avoid skin contact: Wear suitable gloves tested to EN374 [PPE15]**	
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**

4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	Skin protection: Gloves: - Observe breakthrough time of the gloves used Respiratory protection: Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day

Solid, high dustiness:

ES7 - Use of Aluminium salts – solid, high dust – in industrial and professional laboratory settings; max Aluminium content = 25%	
Section 1	**Exposure Scenario Title**
Title	**Use of Aluminium salts – solid, high dust – in industrial and professional laboratory settings; max Aluminium content = 25%**
Use Descriptors	Sector of Use: SU9
	Process Categories: PROC15: Use as a laboratory reagent
	Environmental Release Categories: ERC4: Industrial use of processing aids in processes and products, not becoming part of articles
Processes, tasks, activities covered	Use of aluminium salts (solid, high dustiness) in small scale laboratory settings. Max. aluminium content = 25%
Exposure criteria	DNEL, inhalation long term: 1.8 mg/m³
Section 2	**Operational conditions and risk management measures**
Section 2.1	**Control of worker exposure**
Product characteristics	
Physical form of product	Solid, high dustiness [OC6]
Concentration of substance in product	Covers percentage substance in the product up to 25% [G12].
Amounts used	Varies between milliliters (sampling) and cubic meters (material transfers) [OC13]
Frequency and duration of use	Covers daily exposures up to 8 hours (unless stated differently) [G2]
Human factors not influenced by risk management	*Not applicable*
Other Operational Conditions affecting worker exposure	Assumes use at not > 20oC above ambient [G15] Assumes a good basic standard of occupational hygiene is implemented [G1]. Ensure operatives are trained to minimize exposures [EI19]
Contributing Scenarios	**Risk Management Measures**

Below pH2 and above pH11 the substance has corrosive properties: **Use suitable eye protection [PPE26]** **Avoid skin contact: Wear suitable gloves tested to EN374 [PPE15]**	
PROC15: General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	Carry out in a vented booth or extracted enclosure (80% efficiency) [E57]. *Recommendations:* *{Drain down and flush system prior to equipment break-in or maintenance [E55]}.* *{Clean equipment and the work area every day [C&H3]}.* *{Clear spills immediately [C&H13]}.*
Section 3	**Exposure Estimation**
3.1. Health	
Predicted exposures are not expected to exceed the applicable exposure limits (given in section8 of the SDS) when the operational conditions/risk management measures given in section 2 are implemented [G29]	
3.2. Environment	
N.A.	
Section 4	**Guidance to check compliance with the Exposure Scenario**
4.1. Health	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
4.2. Environment	
N.A.	
Section 5	**Additional good practice advice beyond the REACH Chemical Safety Assessment -**
Note: The measures reported in this section have not been taken into account in the exposure estimates related to the exposure scenario above. They are not subject to obligation laid down in Article 37 (4) of REACH.	
Control of Worker Exposure	
Use of PPE	<u>Skin protection:</u> Gloves: - Observe breakthrough time of the gloves used <u>Respiratory protection:</u> Respirators: - Wear a disposable mask only once - Clean non-disposable masks after each use and store in a clean box in a clean area - Wear respirators ≤ 2 hrs/day