

**LIQUID ALUMINUM SALTS**

**EXTENDED SAFETY DATA ANNEX – EXPOSURE SCENARIOS**

**IN ACCORDANCE WITH REGULATION (EC) No 1907/2006**

**CONCERNING THE REGISTRATION, EVALUATION, AUTHORISATION  
AND RESTRICTION OF CHEMICALS (REACH).**

	Life cycle stage							
	Production	Formulation and distribution	End use					
	ES1	ES2	ES3	ES4	ES5	ES6	ES7	ES8
<b>Generic Exposure Scenario Title</b>	Generic ES for the production of substance including transfers and laboratory activities	Generic ES for adding substance to liquid and solid formulations including distribution and associated laboratory substance. Distribution: loading and repacking of substances.	Generic ES for use in synthesis as a process chemical (not as a reactant) and as an intermediate including transfers and laboratory activities	Generic ES for industrial and professional use of <b>substance in spraying formulations</b>	Generic ES for industrial and professional use of <b>substance in non-spraying formulations</b>	Generic ES for special use – as <b>flocculant or a coagulant in water and waste water treatment</b>	Generic ES for use of substance within industrial and professional laboratory settings	Generic ES for use of substance in consumer products (private/household use)
<b>PROCs covered</b>	1,2,3,4,8b,15,22	1,2,3,4,5,8a,8b,9,14,15,19	1,2,3,4,8a,8b,9,15	1,2,3,5,7,8a,8b,9,11,19	1,2,3,4,5,6,8a,8b,9,10,13,14,15,19	2,3,4,5,8a,8b,9,19	15	
<b>ERCs covered</b>	1	2	1,2,4,5,6a,8a	3,4,5,6ab,8abcf,10a,11a	2,3,4,5,6ab,8abcf,10a,11a	2,4,6b,8a,8b,8d	4	8af,10a,11a
<b>PC covered</b>			20,21,26,19	9a,19,20,21,23,26,34,35	1,9a,12,19,20,21,23,26,34,35	20,21,37	21	12,20,35,37
<b>SU covered</b>	8,9	10	6b,8,9,14	7,5,6b	1,5,6b,7,13,19	2,5,6b,10,23	9	1,13,19,23
<b>Description/Use</b>								
Manufacturing/production	X							
Industrial use/formulation		X						
Use in synthesis as a process chemical (not as a reactant) and as an intermediate			X				X	
Use in water treatment: treatment of raw and potable		X				X		
Use in water treatment: treatment of municipal and industrial waste waters		X				X		
Use in synthesis of pulp, paper and board			X					
Use as/in washing agents and disinfectants		X		X	X		x	
Use as/in photographic chemicals		X		X	X			X
Use in textile and leather processing		X			X			
Use as mordant in dyeing, fireproofing and waterproofing textiles, leather and paper products		X		X	X			
Use as/in adhesives for furniture industry		X			X			
Use in manufacturing of resins			X					
Use in construction chemicals		X			X			X
Use in cosmetics		X						X
Use as chemical etching agent for metals		X		X	X			
Use in fertilisers Unclear if product remains in fertilisers		X						
Use for surface coating of pigment		X		X	X			
Laboratory							X	
Use for production of adsorbance and catalysts products			X					

**ES1 - Manufacture of Aluminium salts – Aqueous solution – max Aluminium content = 25%**

**Section 1**

**Exposure Scenario Title**

Title	<b>Manufacture of Aluminium salts - aqueous solution; Aluminium content = max. 25%</b>
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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC1:</b> General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.

<p><b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i> {Ensure the system is closed} {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC4:</b> General exposures (open systems) [CS16]. Batch process [CS55] (open systems) [CS108]; Drum/batch transfers [CS8]. With sample collection [CS56]. ; Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i> {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8b:</b> General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i> {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&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC15:</b> General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i> {Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>Section 2.2</b></p>	<p><b>Control of environmental exposure</b></p>
<p>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.</p>	
<p><b>Section 3</b></p>	<p><b>Exposure Estimation</b></p>
<p><b>3.1. Health</b></p>	
<p>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]</p>	
<p><b>3.2. Environment</b></p>	
<p>N.A.</p>	
<p><b>Section 4</b></p>	<p><b>Guidance to check compliance with the Exposure Scenario</b></p>
<p><b>4.1. Health</b></p>	
<p>The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]</p>	
<p><b>4.2. Environment</b></p>	
<p>N.A.</p>	
<p><b>Section 5</b></p>	<p><b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b></p>

**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: <ul style="list-style-type: none"> <li>- Observe breakthrough time of the gloves used</li> </ul> <u>Respiratory protection:</u> Respirators: <ul style="list-style-type: none"> <li>- Wear a disposable mask only once</li> <li>- Clean non-disposable masks after each use and store in a clean box in a clean area</li> <li>- Wear respirators ≤ 2 hrs/day</li> </ul>
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## 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	<b>Formulation and Distribution of Aluminium salts (aqueous solutions); Max. Aluminium content = 25%</b>
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 tableting, 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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC1:</b> General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.
<b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&H13]}.
<b>PROC4:</b> 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].  <i>Recommendations:</i> {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]}.
<b>PROC5:</b> General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.

<p><b>PROC8a:</b>  General exposures (open systems) [CS16]; Non-dedicated facility [CS82];  Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8b:</b>  General exposures, open systems [CS16].  Dedicated facility [CS81] Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC9:</b>  General exposures [CS1].  Dedicated facility [CS81]  Drum and small package filling [CS6].  Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC14:</b>  General exposures (open systems) [CS16]  Production or preparation of articles by tableting, compression, extrusion or pelletisation [CS100]</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC15:</b>  General exposures [CS1].  Laboratory activities [CS36].  Small scale [CS61].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>

<p><b>PROC19:</b> General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].</p>	<p><b>Industrial workers:</b>  <b>5-25%:</b> Avoid carrying out operation for more than 1 hour [OC11]  <b>&lt;5%:</b> Avoid carrying out operation for more than 4 hours [OC12]  <b>&lt;1%:</b> No specific measures identified [EI18]</p> <p><b>Professional workers:</b>  <b>5-25%:</b> Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]  <b>Or:</b> Avoid carrying out operation for more than 15 minutes [OC10]{  <b>&lt;5%:</b> Avoid carrying out operation for more than 1 hour [OC11]  <b>&lt;1%:</b> Avoid carrying out operation for more than 4 hours [OC12]</p> <p><i>Recommendations:</i>  <i>{Clean equipment and the work area every day [C&amp;H3]}</i>  <i>{Clear spills immediately [C&amp;H13]}</i>  <i>{Stay upwind/keep distance from source [EI22]}.</i></p>
<p><b>Section 2.2</b></p>	<p><b>Control of environmental exposure</b></p>
<p>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.</p>	
<p><b>Section 3</b></p>	<p><b>Exposure Estimation</b></p>
<p><b>3.1. Health</b></p>	
<p>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]</p>	
<p><b>3.2. Environment</b></p>	
<p>N.A.</p>	
<p><b>Section 4</b></p>	<p><b>Guidance to check compliance with the Exposure Scenario</b></p>
<p><b>4.1. Health</b></p>	
<p>The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]</p>	
<p><b>4.2. Environment</b></p>	
<p>N.A.</p>	
<p><b>Section 5</b></p>	<p><b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b></p>
<p><b>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.</b></p>	
<p><b>Control of Worker Exposure</b></p>	
<p>Use of PPE</p>	<p><u>Skin protection:</u>  Gloves:  - Observe breakthrough time of the gloves used  <u>Respiratory protection:</u></p>



	Respirators: <ul style="list-style-type: none"> <li>- Wear a disposable mask only once</li> <li>- Clean non-disposable masks after each use and store in a clean box in a clean area</li> <li>- Wear respirators <math>\leq</math> 2 hrs/day</li> </ul>
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### Exposure Scenario 3: Use in synthesis and as Intermediate

#### Aqueous solution:

<b>ES3 – Use of Aluminium salts (aqueous solutions) in synthesis as a process chemical and as an intermediate; Max. Aluminium content = 25%</b>	
<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	<b>Use of Aluminium salts (aqueous solutions) in synthesis as a process chemical and as an intermediate; Max. Aluminium content = 25%</b>
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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC1:</b> General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.
<b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&H13]}.
<b>PROC4:</b> 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].  <i>Recommendations:</i> {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]}.
<b>PROC8a:</b> 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].  <i>Recommendations:</i> {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]}.
<b>PROC8b:</b> General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.

<b>PROC9:</b> General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> <i>{Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</i>
<b>PROC15:</b> General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18].  <i>Recommendations:</i> <i>{Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&amp;H3]}.{Clear spills immediately [C&amp;H13]}.</i>
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
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.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	
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]	
<b>3.2. Environment</b>	
N.A.	
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
<b>4.2. Environment</b>	
N.A.	
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b>
<b>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.</b>	
<b>Control of Worker Exposure</b>	
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

## Exposure Scenario 4: Use in spraying Formulations

**Aqueous solution:**

<b>ES4 – Industrial and Professional use of Aluminium salts in spraying formulations (aqueous solutions); Max. aluminium content = 25%</b>	
<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	<b>Industrial and Professional Use of Aluminium salts in spraying formulations (aqueous solutions) – Max. Aluminium content = 25%</b>
Use Descriptor	<p>Sector of Use: Industrial (SU5, SU6b, SU7)</p> <p>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</p> <p>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</p>
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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	

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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC1:</b> General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.
<b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&H13]}.
<b>PROC5:</b> General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.

<p><b>PROC7:</b> General exposures [CS1]. Spraying [CS10].</p>	<p><b>5-25%:</b> 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 &gt;20 (90% efficiency) [E70]. Wear a respirator conforming to EN140 with Type A/P2 filter or better {PPE29} <b>Or:</b> 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] <b>Or:</b> 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 &gt;20 (90% efficiency) [E70]. Plus: Avoid carrying out operation for more than 1 hour [OC11] <b>&lt;5%:</b> Avoid carrying out operation for more than 4 hours [OC12] Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] <b>&lt;1%:</b> Limit the substance content in the product to 1% [OC16]. Avoid carrying out operation for more than 15 minutes [OC10]{  <i>Recommendations:</i> {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8a:</b> General exposures (open systems) [CS16]; Non-dedicated facility [CS82]; Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].  <i>Recommendations:</i> {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8b:</b> General exposures, open systems [CS16]. Dedicated facility [CS81] Material transfers [CS3]. Equipment cleaning and maintenance [CS39]. Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].  <i>Recommendations:</i> {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC9:</b> General exposures [CS1]. Dedicated facility [CS81] Drum and small package filling [CS6]. Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].  <i>Recommendations:</i> {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>

<p><b>PROC11:</b> General exposures [CS1]. Spraying [CS10].</p>	<p><b>5-25%:</b> 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 &gt;20 (80% efficiency) [E70]. Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]</p> <p><b>Or:</b> 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 &gt;20 (80% efficiency) [E70]. Avoid carrying out operation for more than 15 minutes [OC10]</p> <p><b>&lt;5%:</b> 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 &gt;20 (80% efficiency) [E70]. Avoid carrying out operation for more than 1 hour [OC11]</p> <p><b>&lt;1%:</b> Avoid carrying out operation for more than 15 minutes [OC10]</p> <p><i>Recommendations:</i> {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC19:</b> General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].</p>	<p><b>Industrial workers:</b></p> <p><b>5-25%:</b> Avoid carrying out operation for more than 1 hour [OC11]{</p> <p><b>&lt;5%:</b> Avoid carrying out operation for more than 4 hours [OC12]</p> <p><b>&lt;1%:</b> No specific measures identified [EI18]</p> <p><b>Professional workers:</b></p> <p><b>5-25%:</b> Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]</p> <p><b>Or:</b> Avoid carrying out operation for more than 15 minutes [OC10]{</p> <p><b>&lt;5%:</b> Avoid carrying out operation for more than 1 hour [OC11]</p> <p><b>&lt;1%:</b> Avoid carrying out operation for more than 4 hours [OC12]</p> <p><i>Recommendations:</i> {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]} {Stay upwind/keep distance from source [EI22]}.</p>
<p><b>Section 2.2</b></p>	<p><b>Control of environmental exposure</b></p>
<p>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.</p>	

<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	
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]	
<b>3.2. Environment</b>	
N.A.	
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
<b>4.2. Environment</b>	
N.A.	
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b>
<b>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.</b>	
<b>Control of Worker Exposure</b>	
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

## 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%**

<b>Section 1</b>	<b>Exposure Scenario Title</b>
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Title	<b>Industrial and Professional Use of Aluminium salts in non-spraying formulations (aqueous solutions) – Max. Aluminium content = 25%</b>
Use Descriptor	<p>Sector of Use: Industrial (SU1, SU5, SU6b, SU7, SU13, SU19)</p> <p>Process Categories:</p> <p>PROC1: Use in a closed process, no likelihood of exposure</p> <p>PROC2: Use in a closed continuous process, with occasional controlled exposure</p> <p>PROC3: Use in a closed batch process (synthesis or formulation)</p> <p>PROC4: Use in batch and other process (synthesis) where opportunity for exposure arises</p> <p>PROC5: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)</p> <p>PROC6: Calendering operations</p> <p>PROC8a: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities</p> <p>PROC8b: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities</p> <p>PROC9: Transfer of substance or preparation into small containers (dedicated filling line, including weighing)</p> <p>PROC10: Roller application or brushing</p> <p>PROC13: Treatment of articles by dipping and pouring</p> <p>PROC14: Production of preparations or articles by tableting, compression, extrusion, pelletization</p> <p>PROC15: Use as a laboratory reagent</p> <p>PROC19: Hand-mixing with intimate contact and only PPE available</p> <p>Environmental Release Categories:</p> <p>ERC2: Formulation of preparations</p> <p>ERC3: Formulation in materials</p> <p>ERC4: Industrial use</p> <p>ERC5: Industrial use resulting in inclusion into or onto a matrix</p> <p>ERC6a: Industrial use resulting in manufacture of another substance (use of intermediates)</p> <p>ERC6b: Industrial use of reactive processing aids</p> <p>ERC8a: Wide dispersive indoor use of processing aids in open systems</p> <p>ERC8b: Wide dispersive indoor use of reactive substances in open systems</p> <p>ERC8c: Wide dispersive indoor use resulting in inclusion into or onto a matrix</p> <p>ERC8f: Wide dispersive outdoor use resulting in inclusion into or onto a matrix</p> <p>ERC10a: Wide dispersive outdoor use of long-life articles and materials with low release</p> <p>ERC11a: Wide dispersive indoor use of long-life articles and materials with low release</p>
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/m <sup>3</sup>
<b>Section 2 Operational conditions and risk management measures</b>	
<b>Section 2.1 Control of worker exposure</b>	
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC1:</b> General exposures (closed systems) [CS15]. Continuous process [CS54]. Process sampling [CS2] (closed systems) [CS107]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}.
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.
<b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&H13]}.
<b>PROC4:</b> 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].  <i>Recommendations:</i> {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]}.
<b>PROC5:</b> General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.
<b>PROC6:</b> General exposures (open systems) [CS16] Mixing operations (open systems) [CS30]. Material transfers [CS3]. ; Batch process [CS55]. ; Cleaning [CS47].	No specific measures identified [EI18].  <i>Recommendations:</i> {Clean equipment and the work area every day [C&H3]}. ; {Clear spills immediately [C&H13]}.

<p><b>PROC8a:</b>  General exposures (open systems) [CS16]; Non-dedicated facility [CS82];  Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8b:</b>  General exposures, open systems [CS16].  Dedicated facility [CS81] Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC9:</b>  General exposures [CS1].  Dedicated facility [CS81]  Drum and small package filling [CS6].  Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>

<p><b>PROC10:</b>  General exposures (open systems) [CS16]. Rolling, Brushing [CS51]  Equipment cleaning and maintenance [CS39].</p>	<p><b>Industrial workers:</b>  <b>5-25%:</b>  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 &gt;20 (80% efficiency) [E70].  <b>Or:</b>  Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]  <b>Or:</b>  Avoid carrying out operation for more than 1 hour [OC11]  <b>&lt;5%:</b>  Avoid carrying out operation for more than 4 hours [OC12]  <b>&lt;1%:</b>  No specific measures identified [EI18]</p> <p><b>Professional workers:</b>  <b>5-25%:</b>  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 &gt;20 (80% efficiency) [E70]. Plus:  Avoid carrying out operation for more than 1 hour [OC11]  <b>Or:</b>  Avoid carrying out operation for more than 4 hours [OC12]  Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29]  <b>&lt;5%:</b>  Avoid carrying out operation for more than 1 hour [OC11]  <b>Or:</b>  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 &gt;20 (80% efficiency) [E70].  <b>&lt;1%:</b>  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 &gt;20 (80% efficiency) [E70].</p> <p><i>Recommendations:</i>  {Use long handled tools where possible [E50]}. {Clean equipment and the work area every day [C&amp;H3]}.  {Clear spills immediately [C&amp;H13]}  {Avoid splashing [C&amp;H15]}</p>
<p><b>PROC13:</b>  General exposures, open systems [CS16].  Dipping, immersion and pouring [CS4]</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]}. ;  {Clear spills immediately [C&amp;H13]}.</p>

<p><b>PROC14:</b> General exposures (open systems) [CS16] Production or preparation of articles by tableting, compression, extrusion or pelletisation [CS100]</p>	<p>No specific measures identified [EI18]. <i>Recommendations:</i> {Drain down and flush system prior to equipment break-in or maintenance [E55]} .{Clean equipment and the work area every day [C&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC15:</b> General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].</p>	<p>No specific measures identified [EI18]. <i>Recommendations:</i> {Drain down and flush system prior to equipment break-in or maintenance [E55]} {Clean equipment and the work area every day [C&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC19:</b> General exposures [CS1]. Mixing operations (open systems) [CS30]. Manual [CS34].</p>	<p><b>Industrial workers:</b> <b>5-25%:</b> Avoid carrying out operation for more than 1 hour [OC11] <b>&lt;5%:</b> Avoid carrying out operation for more than 4 hours [OC12] <b>&lt;1%:</b> No specific measures identified [EI18]</p> <p><b>Professional workers:</b> <b>5-25%:</b> Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] <b>Or:</b> Avoid carrying out operation for more than 15 minutes [OC10]{ <b>&lt;5%:</b> Avoid carrying out operation for more than 1 hour [OC11] <b>&lt;1%:</b> Avoid carrying out operation for more than 4 hours [OC12]</p> <p><i>Recommendations:</i> {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]} {Stay upwind/keep distance from source [EI22]}.</p>
<p><b>Section 2.2</b></p>	<p><b>Control of environmental exposure</b></p>
<p>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.</p>	
<p><b>Section 3</b></p>	<p><b>Exposure Estimation</b></p>
<p></p>	
<p><b>3.1. Health</b></p>	
<p>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]</p>	
<p><b>3.2. Environment</b></p>	
<p>N.A.</p>	
<p><b>Section 4</b></p>	<p><b>Guidance to check compliance with the Exposure Scenario</b></p>
<p><b>4.1. Health</b></p>	
<p>The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]</p>	

<b>4.2. Environment</b>	
N.A.	
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b>
<b>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.</b>	
<b>Control of Worker Exposure</b>	
Use of PPE	<u>Skin protection:</u> Gloves: <ul style="list-style-type: none"> <li>- Observe breakthrough time of the gloves used</li> </ul> <u>Respiratory protection:</u> Respirators: <ul style="list-style-type: none"> <li>- Wear a disposable mask only once</li> <li>- Clean non-disposable masks after each use and store in a clean box in a clean area</li> <li>- Wear respirators ≤ 2 hrs/day</li> </ul>

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

### Aqueous solution:

<b>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</b>	
<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	<b>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.</b>
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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC2:</b> General exposures [CS1]. Continuous process [CS54]. Process sampling [CS2] (open systems) [CS108]	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} {Clear transfer lines prior to de-coupling [E39]}. {Clear spills immediately [C&H13]}.
<b>PROC3:</b> General exposures [CS1]. Use in contained batch processes [CS37]. With sample collection [CS56]. Equipment cleaning and maintenance [CS39].	No specific measures identified [EI18].  <i>Recommendations:</i> {Ensure the system is closed} ; {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clear spills immediately [C&H13]}.
<b>PROC4:</b> 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].  <i>Recommendations:</i> {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]}.
<b>PROC5:</b> General exposures (open systems) [CS16]. Mixing operations (open systems) [CS30]. Material transfers [CS3]. Batch process [CS55]. Cleaning [CS47].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.

<p><b>PROC8a:</b>  General exposures (open systems) [CS16]; Non-dedicated facility [CS82];  Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC8b:</b>  General exposures, open systems [CS16].  Dedicated facility [CS81] Material transfers [CS3].  Equipment cleaning and maintenance [CS39].  Bulk transfers [CS14].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {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&amp;H3]}. {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC9:</b>  General exposures [CS1].  Dedicated facility [CS81]  Drum and small package filling [CS6].  Equipment cleaning and maintenance [CS39].</p>	<p>No specific measures identified [EI18].</p> <p><i>Recommendations:</i>  {Drain down and flush system prior to equipment break-in or maintenance [E55]}. {Clean equipment and the work area every day [C&amp;H3]} {Clear spills immediately [C&amp;H13]}.</p>
<p><b>PROC19:</b>  General exposures [CS1]. Mixing operations (open systems) [CS30].  Manual [CS34].</p>	<p><b>Industrial worker:</b>  <b>5-25%:</b>  Avoid carrying out operation for more than 1 hour [OC11]  <b>1-5%:</b>  Avoid carrying out operation for more than 4 hours [OC12]  <b>&lt;1%:</b>  No specific measures identified [EI18].</p> <p><b>Professional worker:</b>  <b>5-25%:</b>  Wear a respirator conforming to EN140 with Type A/P2 filter or better [PPE29] <b>or:</b>  Avoid carrying out operation for more than 15 minutes [OC10]{  <b>1-5%:</b>  Avoid carrying out operation for more than 1 hour [OC11]  <b>&lt;1%:</b>  Avoid carrying out operation for more than 4 hours [OC12]</p> <p><i>Recommendations:</i>  {Clean equipment and the work area every day [C&amp;H3]}.  {Clear spills immediately [C&amp;H13]}. {Stay upwind/keep distance from source [EI22]}.</p>
<p><b>Section 2.2</b></p>	<p><b>Control of environmental exposure</b></p>
<p>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.</p>	
<p><b>Section 3</b></p>	<p><b>Exposure Estimation</b></p>
<p><b>3.1. Health</b></p>	
<p>Predicted exposures are not expected to exceed the applicable exposure limits (given in section8 of the SDS)</p>	



when the operational conditions/risk management measures given in section 2 are implemented [G29]	
<b>3.2. Environment</b>	
N.A.	
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
<b>4.2. Environment</b>	
N.A.	
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b>
<b>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.</b>	
<b>Control of Worker Exposure</b>	
Use of PPE	<u>Skin protection:</u> Gloves: <ul style="list-style-type: none"> <li>- Observe breakthrough time of the gloves used</li> </ul> <u>Respiratory protection:</u> Respirators: <ul style="list-style-type: none"> <li>- Wear a disposable mask only once</li> <li>- Clean non-disposable masks after each use and store in a clean box in a clean area</li> <li>- Wear respirators ≤ 2 hrs/day</li> </ul>

## Exposure Scenario 7: Use in laboratory

### Aqueous solution:

<b>ES7 – Use of Aluminium salts – Aqueous solution – in industrial and professional laboratory settings; max Aluminium content = 25%</b>	
<b>Section 1</b>	<b>Exposure Scenario Title</b>
Title	<b>Use of Aluminium salts – Aqueous solution – in industrial and professional laboratory settings; max Aluminium content = 25%</b>
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/m <sup>3</sup>
<b>Section 2</b>	<b>Operational conditions and risk management measures</b>
<b>Section 2.1</b>	<b>Control of worker exposure</b>
<b>Product characteristics</b>	
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	<i>Not applicable</i>
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]
<b>Contributing Scenarios</b>	<b>Risk Management Measures</b>
<b>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]</b>	
<b>PROC15:</b> General exposures [CS1]. Laboratory activities [CS36]. Small scale [CS61].	No specific measures identified [EI18].  <i>Recommendations:</i> {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]}.
<b>Section 2.2</b>	<b>Control of environmental exposure</b>
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.	
<b>Section 3</b>	<b>Exposure Estimation</b>
<b>3.1. Health</b>	
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]	
<b>3.2. Environment</b>	
N.A.	
<b>Section 4</b>	<b>Guidance to check compliance with the Exposure Scenario</b>
<b>4.1. Health</b>	
The ECETOC TRA (V2.0) tool has been used to estimate workplace exposures unless otherwise indicated [G21]	
<b>4.2. Environment</b>	
N.A.	
<b>Section 5</b>	<b>Additional good practice advice beyond the REACH Chemical Safety Assessment - (Section Optional)</b>
<b>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.</b>	
<b>Control of Worker Exposure</b>	
Use of PPE	<u>Skin protection:</u> 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  $\leq 2$  hrs/day