



**Extended SAFETY DATA SHEET**  
**In accordance with Regulation (EC) 1907/2006 (REACH), Annex II, amended**  
**with Regulation (EC) 2020/878**

**Ammonium nitrate**

<b>1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY</b>	
<b>1.1 Product identifier</b>	
Trade name:	Ammonium Nitrate minimum 34.4 % N
Other names:	Ammonium Nitrate
Chemical name:	Nitric acid ammonium salt
INDEX # as listed in Annex 6, Table 3.1 of the CLP Regulation:	Not listed in an Annex VI / CLP.
CAS/EC number:	6484-52-2/229-347-8
REACH registration no(s):	01-2119490981-27-0027
UFI #	H300-900U-F002-G6K5
<b>1.2 Relevant identified uses of the substance or mixture and uses advised against</b>	
Uses:	<u>Uses by workers in industrial settings:</u> M-1: Manufacturing of the substance, including handling, storage and quality control. F-1: Formulation of chemicals and fertilizers – formulation of preparations. IW-1: Industrial use as intermediate incl. sampling, loading, filling, transfer, bagging, storage, quality control - industrial use resulting in manufacture of another substance (use of intermediates). IW-2: Industrial use as reactive processing aid incl. sampling, loading, filling, transfer, bagging, storage, quality control - industrial use of reactive processing aids. PW-1: Use by professional worker (outdoor and indoor of reactive substances in open systems)
Uses advised against:	<b>Use of Ammonium nitrate containing fertilizers if weight of nitrogen in relation to ammonium nitrate is equal or more than 16 %.</b> <b>Consumer products may contain up to 46% ammonium nitrate.</b>
<b>1.3 Details of the supplier of the safety data sheet</b>	
Manufacturer/Supplier	AGROPOLYCHIM JSC BULGARIA Industrial zone 9160, DEVNYA Tel: +359 / 519 97 526,511 URL website: <a href="http://www.agropolychim.bg">www.agropolychim.bg</a>
Person responsible for the Safety Data Sheet (with e-mail address)	Eng. Miroslava Tsvetkova AGROPOLYCHIM JSC BULGARIA Industrial zone 9160, DEVNYA Tel.: +359 / 519 97 419 Email: <a href="mailto:m.tsvetkova@agropolychim.bg">m.tsvetkova@agropolychim.bg</a>
<b>1.4 Emergency telephone number</b>	

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Emergency phone number in Bulgaria – Toxicology Clinique “Pirogov” Medical Institute:		+359 2 9154 233; +359 2 9154 409 (24 hours / day) Toxicology Clinique, Pirogov National Institute, Sofia
International emergency phone number		112
<b>2. HAZARDS IDENTIFICATION</b>		
<b>2.1 Classification of the substance or mixture</b>		
Classification based on self-classification. The substance Ammonium nitrate is not included in Annex VI, Table. 3.1 of Regulation 1272/2008 (CLP).		
<b>2.1.1. Classification according to Regulation 1272/2008 (CLP)</b> Oxidizing solids, Hazard category 3 (Oxid. Solid3), H272 Serious eye irritation, Hazard category 2 (Eye Irrit. 2), H319.		
<b>2.1.2 Additional information</b> For the full text of the hazard statements: see SECTION 16.		
<b>2.2 Label elements</b>		
Labelling in accordance with Regulation 1272/2008 (CLP)		
Hazard pictogram(s):		GHS07  GHS03 
Signal word		Warning
Hazard statement(s):	H272 H319	Cat.3 - May intensify fire; oxidiser. Cat.2 - Causes serious eye irritation.
Precautionary statement(s):	P210 P220 P370+P378 P264 P280 P305+P351+P338 P337+P313 P501:	Keep away from heat/ sparks/open flames/hot surfaces. - No smoking. Keep/Store away from clothing and combustible materials. In case of fire: Use water for extinction. Wash exposed parts thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. In case of prolonged eye irritation, seek medical attention. Dispose of contents/container in accordance with local/regional/national /international regulations.
<b>2.3 Other hazards</b>		
PBT/vPvB criteria:		According to Annex XIII of Regulation (EC) No 1907/2006, no

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	PBT and vPvB assessment has been conducted since ammonium nitrate is inorganic.
Endocrine disrupting properties:	Data lacking
Nanoforms:	This product does not contain nanoforms or nanoform-containing substances.
Other hazards identifications:	When wet, a slippery surface is formed.

**3. COMPOSITION / INFORMATION ON INGREDIENTS**

**Mixture:**

The product is produced with an inorganic additive. Usually the product is to be treated with anticaking agent different commercial grades. This product is relevant with Fertilizer Regulation (EU) 2019/1009

Chemical name/REACH registration number	CAS no.	EC no.	Classification according to Regulation (EC) 1272/2008 (CLP)	Typical conc.	SCL Limits, M-Coeff. ATE-Value; Type
Nitric acid ammonium salt: 01-2119490981-27-0027	6484-52-2	229-347-8	May intensify fire; oxidant -H272, cat. 3  Causes serious eye irritation. - H319, cat. 2	98 – 100	No Identified values (1)*
Magnesium nitrate: 01-2119491164-38-0071	10377-60-3	233-826-7	May intensify fire; oxidant -H272, cat. 3	1 – 2	No identified values (1)*

**Type**

- [1] Substance classified as a physical hazard, health hazard and environmental hazard.  
[2] Substance with occupational exposure limits.  
[3] The substance meets the criteria for PBT according to Regulation (EC) № 1907/2006, Annex XIII.  
[4] The substance meets the criteria for very persistent and very bioaccumulative (vPvB) in accordance with Regulation (EC) № 1907/2006, Annex XIII.  
[5] Substance of very high concern.  
For the full text of the hazard statements, see SECTION 16

**4. FIRST-AID MEASURES**

**4.1 Description of first aid measures. The speed of response is important. In case of unconsciousness, place the victim in a stable lateral position. Provide a shower and eye wash near the workplace.**

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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:	<b>Do not induce vomiting!</b> Never give anything by mouth to an unconscious person! Seek medical attention.
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 or if breathing is difficult, give oxygen and seek medical advice. Do not use mouth-to-mouth respiration. Seek medical advice immediately when vapours are intensively inhaled.
<b>4.2 Most important symptoms and effects</b>	
Acute effects	Eye irritation, cough and dryness. Skin redness
Delayed effects	Not known
<b>4.3 Indication of any immediate medical attention and special treatment needed</b>	
To the doctor's attention: Treat symptomatically. In case of ingestion, contact a specialist immediately. Delayed effects may occur in case of fire exposure involving the product.	
<b>5. FIRE-FIGHTING MEASURES</b>	
<b>5.1 Extinguishing media</b>	
Small fire:	<b>If involved in fire:</b> Finely sprayed water.  <b>If not involved in fire:</b> Suitable media for materials involved in fire.
Unsuitable media:	Chemical fire extinguishers, foam, fire blanket, sand.
<b>5.2 Special hazards arising from the substance or mixture</b>	
May be explosive in contact with flammable or organic substances and at confinement during fire. In case of fire, may produce hazardous decomposition products such as nitrogen oxides (NO, NO <sub>2</sub> etc.), ammonia (NH <sub>3</sub> ), amines.	
<b>5.3 Advice for firefighters</b>	
In case of fire, wear personal protective equipment and chemical protective clothing. Use a polyvalent filter. In case of ignition indoors - use an oxygen-insulating gas mask. Don't dispose in a sewer!	
<b>6. ACCIDENTAL RELEASE MEASURES</b>	
<b>6.1 Personal precautions, protective equipment and emergency procedures</b>	
Avoid creating dusty conditions and prevent wind dispersal. Avoid contact with eyes, skin, and clothing. Use suitable protective equipment. Keep away from sources of ignition.	
<b>6.2 Environmental precautions</b>	

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Prevent the material from contact with soil, entering surface water or sanitary sewer system. Do not discharge directly to a water source. If accidental spillage or washings enter drains or watercourses, contact local authority.	
<b>6.3 Methods and material for containment and cleaning up</b>	
Vacuum or sweep up and place into suitable labelled containers for recovery or disposal. Clean up affected area with a large amount of water. Do not collect spilled material in sawdust or other combustible material. Prevent formation of dust clouds. Residual trace can be wiped away.	
<b>6.4 Reference to other sections</b>	
See section 8 for personal protective equipment and section 13 for waste disposal.	
<b>7. HANDLING AND STORAGE</b>	
<b>7.1 Precautions for safe handling</b>	
Technical measures/ Precautions:	Use with adequate ventilation. Local exhaust ventilation should be provided. Avoid contact with eyes, skin and clothing. Avoid creating dusty conditions and prevent wind dispersal. Keep away from sources of ignition (spark or flame). Avoid contamination by any source including metals, dust and organic materials. Keep away from moisture.
General occupation hygiene:	Do not eat, drink or smoke in work areas. Wash hands after use. Remove contaminated clothing and protective equipment before entering eating areas.
<b>7.2 Conditions for safe storage, including any incompatibilities</b>	
Technical measures/ Storage conditions:	<p>In case of indoor storage, use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid creating conditions of dust and do not allow scattering by the wind. Keep away from sources of ignition.</p> <p>Do not store fertilizer in the field near hay, straw, grain, fuels and hydrocarbon-based lubricants, etc.</p> <p>Do not store in direct sunlight and under conditions that allow the occurrence of thermal phases / large temperature fluctuations / to avoid destruction of the product granules. Storage temperature not higher than 30 ° C.</p> <p>Store in piles as their maximum size complies with national and regional legal regulations. Provide a distance for quick access between the piles. Do not store together with other products in the same pile.</p> <p>To comply with the requirements of the Ordinance on the procedure and manner of storage of hazardous chemical substances and mixtures</p> <p>Packaging materials:  Stainless steel (304). Synthetic material.  Non suitable: Zinc, Copper</p>
<b>7.3 Specific end uses:</b>	See exposure scenarios attached to this Safety Data Sheet.

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control parameters

Regulated occupational exposure limit values:

There are no limit values for the content of the substance in the working environment according to Ordinance 13 / 30.12.2003.

The limit values for particulate matter in the working environment, according to Ordinance 13 / 30.12.2003 are 10 mg / m<sup>3</sup>.

The limit values for Insoluble Powder containing less than 2% free crystalline silica in the respirable fraction (not containing fibrous particles), not specified in the application of Ordinance 13 / 30.12.2003 are:

Inhalable fraction 10.0 mg / m<sup>3</sup>

Respirable fraction 4.0 mg / m<sup>3</sup>

Hazard conclusions, following from performed CSA:

Exposure pattern	Type of effects	Derived No Effect Level (DNEL)	
		Workers	Consumers
Oral <sup>1</sup>	Chronic effects - systemic	Not applicable	2.56 mg/kg bw/day
Dermal <sup>1</sup>		5.12 mg/kg bw/day	2.56 mg/kg bw/day
Inhalation <sup>1</sup>		36 mg/m <sup>3</sup>	8.9 mg/m <sup>3</sup>
		PNEC of sewage system:	18 mg/dm <sup>3</sup>

<sup>1</sup>: As an acute toxicity hazard leading to Classification and Labelling of the substance has not been identified, the long-term DNEL is considered sufficient to ensure that effects from acute exposure to the substance do not occur (in accordance with ECHA Guidance on information requirements and chemical safety assessment: Chapter R.8: Characterisation of dose [concentration]-response for human health, May 2008 and Part B: Hazard Assessment, Draft new chapter B.8 Scope of Exposure Assessment, March 2010).

### 8.2 Exposure controls

#### 8.2.1. Appropriate engineering control:

Basic general ventilation (1-3 air changes per hour). Local exhaust ventilation: not required. In addition, an eyewash facility and a safety shower for facilities storing or utilizing this material is good industrial practice.

#### 8.2.2. Individual protection measures, such as personal protective equipment

Respiratory protection:	Dust masks or respirators with suitable filter (recommended EN 143, 149, filters R2, P3).
Dermal protection:	Long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]
Eye protection:	Chemical goggles (EN166) or face shield
Body protection:	Protective work clothes
Hygiene measures:	Wash your hands thoroughly to the elbows and face after working with this product, before eating, smoking and going to the toilet, as well as at the end of the working day. Wash contaminated

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	clothing before reuse.
<b>8.2.3. Environmental exposure controls:</b>	
Dispose of rinse water in accordance with local and national regulations.	
<b>9. PHYSICAL AND CHEMICAL PROPERTIES</b>	
<b>9.1 Information on basic physical and chemical properties</b>	
a) Physical state:	Granules at 20°C and 101.3 kPa
b) Colour	White
c) Odour:	Odourless
d) Melting/freezing temperature:	At 101,3 kPa: 169.6 – 169.7°C; (decomposition starts at 210°C)
e) Boiling temperature/boiling range	Not applicable, decomposes before boiling
f) Flammability:	Non-flammable (based on molecular structure).
g) Lower and upper explosive limits:	Ammonium nitrate with less than 0.2% of combustible substances (UN 1942) is not classified as an explosive.
h) Flash point:	Not relevant, as the substance is an inorganic solid.
i) Autoignition point	Not relevant, as the substance is an inorganic solid. Based on structure, use and transport information, ammonium nitrate is not expected to be a self-heating substance
j) Decomposition temperature	Not relevant, as the substance is an inorganic solid.
k) pH of aqueous solution / 200C (10 g / 100 cm <sup>3</sup> )	> 4.5
l) Kinematic viscosity	Not relevant, as the substance is an inorganic solid.
m) Solubility in water	> 100 g/l at 20°C
n) Partition coefficient n - octanol/water:	Not relevant as the substance is inorganic, considered to be low (based on high water solubility)
o) Vapour pressure	Based on the high melting temperature (170°C) and decomposition at 210°C, the vapour pressure of the solid substance at room temperature is considered to be very low. Calculation of the vapour pressure is not possible for an inorganic substance
p) Relative density (D <sub>4</sub> (20)):	1.72 at 20°C
q) Relative density of vapours:	Not relevant, as the substance is an inorganic solid.
r) Characteristics of the particles	White oval granules with size between 1-5 mm
s) Oxidizing properties:	Oxidizer
t) Specific conductivity:	No data
u) Surface tension:	The surface tension study was not performed because the substance is inorganic.
<b>9.2 Other information</b>	



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<b>9.2.1 Information related to physical hazard classes</b>	
This product has oxidizing properties.	
<b>9.2.2 Other characteristics regarding safety</b>	
Highly hygroscopic product.	
<b>10. STABILITY AND REACTIVITY</b>	
<b>10.1 Reactivity</b>	
Unstable at high temperature. Strong oxidizing agent and reacts violently with combustible materials and reducing agents (see section 10.5).	
<b>10.2 Chemical stability</b>	
Stable under recommended storage and handling conditions (see section 7, handling and storage).	
<b>10.3 Possibility of hazardous reactions</b>	
Decomposes on heating - danger of release of products (see Section 10.5).	
<b>10.4 Conditions to avoid</b>	
Decomposes on heating. Avoid enclosed spaces, contact with incompatible materials, exposure to atmospheric conditions.	
<b>10.5 Incompatible materials</b>	
Reducing agents, mineral acids and bases, metal dust, combustible materials, chromates, zinc, copper and copper alloys, chlorates, cobalt-containing alloys. Do not mix with hard urea.	
<b>10.6 Hazardous decomposition products</b>	
Under normal conditions of storage and use, hazardous decomposition products should not be produced. In case of fire, nitrogen oxides (NO, NO <sub>2</sub> ).	
<b>11. TOXICOLOGICAL INFORMATION</b>	
<b>11.1 Information on the hazard classes defined in Regulation (EC) No. 1272/2008</b>	
<b>11.1.1 ACUTE TOXICITY</b>	
Acute oral toxicity:	Rat LD <sub>50</sub> : 2950 mg / kg bw (OECD 401); non toxic
Acute dermal toxicity:	Rat LD <sub>50</sub> : 5000 mg / kg bw (OECD 402); non toxic
Acute inhalation toxicity:	Not applicable; non toxic
<b>11.1.2 LOCAL EFFECTS</b>	
Skin Corrosion / skin irritation:	Rabbit: non-irritating (OECD 404)
Serious eye damage / eye irritation:	Rabbit: irritating (OECD 405)
Respiratory / Skin sensitization	Mice: not sensitizing (OECD 429)
<b>11.1.3 OTHER ADVERSE EFFECTS</b>	
Germ cell mutagenicity:	<b>In vitro:</b> No adverse effect observed (negative) <b>In vivo:</b> No adverse effect observed (negative)
Carcinogenicity:	Non carcinogenic (OECD 453, with ammonium sulphate).
Reproductive toxicity:	Ingestion 28 days NOAEL ≥ 1500 mg / kg body weight per day, rats (OECD 422, with potassium nitrate).
STO (specific toxicity to certain	<b>Inhalation - local effects:</b> No study available




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organs) — single exposure	<b>Inhalation - local effects:</b> No study available
STOT (specific toxicity to certain organs) — repeated exposure;	<b>Via oral route - systemic effects:</b> No adverse effect observed (NOAEL: 256 mg/kg bw/day) (subacute; rat) <b>Dermal - systemic effects:</b> No study available <b>Inhalation - systemic effects:</b> No adverse effect observed (NOAEC: 185 mg/m <sup>3</sup> ) (subacute; rat)
Aspiration hazard:	This product is solid and this hazard is not relevant.
<b>11.2 Information on other hazards</b>	
<b>11.2.1 Endocrine-disrupting properties</b>	
Data Lacking	
<b>11.2.2 Other information</b>	
No other effects are known	
<b>12. ECOLOGICAL INFORMATION</b>	
<b>12.1 Toxicity</b>	
Fish (acute):	LC <sub>50</sub> : > 447 mg/L
Fish (long-term):	Testing is not considered necessary
Aquatic invertebrates (acute):	EC <sub>50</sub> / LC <sub>50</sub> : 490 mg/L
Aquatic invertebrates (long-term):	Testing is not considered necessary
Algae (acute):	EC <sub>50</sub> : 83 mg/L
Algae (long-term)	NOEC 1700 mg/L
<b>12.2 Persistence and degradability</b>	
Biodegradation:	Standard test is not applicable as the substance is inorganic. In addition, in the anaerobic transformation of ammonium, one group of bacteria oxidizes ammonium to nitrite while another group oxidizes nitrite into nitrate. The average biodegradation rate in wastewater plant at 20°C is 52 g N/kg dissolved solid/day. Nitrate degradation is fastest in anaerobic conditions. In the anaerobic transformation of nitrate into N <sub>2</sub> , N <sub>2</sub> O and NH <sub>3</sub> , the biodegradation rate in wastewater plant at 20°C is 70 g N/kg dissolved solid /day.
Hydrolysis:	No hydrolysable group is present, will completely dissociate into ions.
<b>12.3 Bioaccumulative potential</b>	
Octanol-water partition coefficient (K <sub>ow</sub> ):	Not relevant as the substance is inorganic, but considered to be low (based on high water solubility)
Bioconcentration factor (BCF):	Low potential for bioaccumulation (based on substance properties).
<b>12.4 Mobility in soil</b>	
Adsorption coefficient:	Low potential for adsorption (based on substance properties).
<b>12.5 Results of PBT and vPvB assessment</b>	

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In accordance with REACH Annex XIII, PBT assessment does not apply as this substance is an inorganic substance. PBT assessment does not apply.	
<b>12.6 Endocrine disrupting properties</b>	
No available data for endocrine disrupting properties.	
<b>12.7 Other adverse effects</b>	
Not known. Follow the relevant identified uses and see uses against.	
<b>13. DISPOSAL CONSIDERATIONS</b>	
Waste from residues:	In accordance with local and national regulations, disposed by landfill or incineration. Controlled biodegradation in waste water treatment is possible. Don't allow product disposal in the sewage system and send waste waters for treatment. Disposal of this product must always be carried out in accordance with the requirements of National waste management legislation.
Waste code: <b>European waste catalogue (EWC)</b>	06 10 02* (wastes containing hazardous substances)
Container:	Containers should be cleaned by appropriate method and then re-used or disposed by landfill or incineration as appropriate, in accordance with local and national regulations. Do not remove label until container is thoroughly cleaned.
<b>14. TRANSPORT INFORMATION</b>	
UN Number:	ADR/RID: UN2067 ADN/ADNR: UN2067 IMDG: UN2067 ICAO/IATA: UN2067
Proper shipping name:	Ammonium nitrate, based fertilizer
Transport hazard classes:	ADR/RID: 5.1 ADN/ADNR: 5.1 IMDG: 5.1 ICAO/IATA: 5.1
Packaging group:	ADR/RID: III ADN/ADNR: III IMDG: III
Label	
ADR/RID:	

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Special precautions:	Hazard identification number: 50. Packing group: III Limited quantity: LQ12. Classification code: O2; Hazard class: 5.1 Approved transport: B; Tunnel restriction code: E IMDG: EmS codes: F-H, S-Q
Transport in bulk, Annex II / MARPOL / IBC Code	IMSBC code – Group B

15. REGULATORY INFORMATION				
15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture:	Regulation (EC) 1907/2006 (REACH) Fertilizer Regulation (EU) 2019/1009 Directive 2012/18/EC dated 4.07.2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (SEVEZO III): listed in Part 2 of Appendix 1 as ammonium nitrate (1250/5000): fertilizer grade. It refers to simple and complex fertilizers, ammonium nitrate based, that meet the requirements of EU Regulation for fertilizing products, and the nitrogen content as a result of ammonium nitrate is: <ul style="list-style-type: none"><li>• more than 24,5% (by weight), except for mixtures of simple fertilizers based on ammonium nitrate with dolomite, limestone and / or calcium carbonate with a purity of at least 90%; more than 15,75% (by weight) for mixtures of ammonium nitrate and ammonium sulphate;</li><li>• more than 28% (28% by weight) nitrogen content due to the presence of ammonium nitrate corresponds to 80% ammonium nitrate) for mixtures of simple fertilizers based on ammonium nitrate with dolomite, limestone and / or calcium carbonate with purity at least 90%.</li></ul>			
	Dangerous subst.	Concentration limits, t		
		CAS #	Low hazard potential	High hazard potential
	Ammonium nitrate	6484-52-2	1250	5000
	Regulation for Classification, Labeling and Packaging (CLP) 1272/2008.			
15.2 Chemical safety assessment:	In accordance with REACH Article 14, a Chemical Safety Assessment has been carried out for this substance.			
15.3 Regulation 2019/1148 amending Regulation EC №98/2013 on a marketing and use of explosive precursors harmonized rules across	Ammonium nitrate with concentration of nitrogen above 16% is under the scope of Appendix 1 with code 3102 30 10 (water solution) and 3102 30 90 (others). <b>Purchasing, handling and storage from individual consumer is strictly prohibited!</b>			

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Europe	
<b>16. OTHER INFORMATION</b>	
<p>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.</p>	
<p>Classification in accordance with Regulation 1272/2008, as listed in Annex VI:</p> <p><i>None.</i></p> <p>Classification in accordance with Regulation 1272/2008, by self-classification based on the performed CSA:</p> <p><i>May intensify fire; oxidiser. (H272), cat.3</i>  <i>Causes serious eye irritation (H319), cat.2</i></p>	
Version:	11
Revision date:	September, 2022
Previous revision date:	April, 2022
Release info:	Section 3; 9; 11; 12; 16
Created/Revised by:	"AGROPOLYCHIM"AD, Production Department
Abbreviations and acronyms	<p>ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road</p> <p>EC: European Community</p> <p>EN: European standard</p> <p>ERC: Category for release into the environment</p> <p>EU: European Union</p> <p>UN Number: United Nation number</p> <p>ICAO: International Civil Aviation Organization</p> <p>IMDG: International Maritime Regulations for the Transport of Dangerous Goods by Sea</p> <p>IATA: International Air Transport Association</p> <p>LC50: Medium lethal dose</p> <p>EC50: Effect Dose</p> <p>DNEL: Predictable no-effect level</p> <p>NOAEC / NOAEL: Concentration / level of unobserved adverse effect</p> <p>OECD: Organization for Economic Co-operation and Development</p> <p>PBT: Persistence, bioaccumulation, toxicity</p> <p>vPvB: High persistence and strong bioaccumulation</p> <p>PNEC: Predictable no-effect exposure concentration</p> <p>CSA: Chemical Safety assessment</p> <p>PROC: Process category</p> <p>SU: Sector of use</p>

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**ANNEX 1**

<b>1. Exposure scenario (1)</b>	
<b>1.1 Manufacture - Manufacturing of the substance (continuous and batch synthesis), including handling, storage and q control</b>	
<b>Environment contributing scenario(s):</b>	
Manufacturing of the substance (continuous and batch synthesis), including handling, storage and q control	ERC 1
<b>Worker contributing scenario(s):</b>	
Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Production of preparations or articles by tableting, compression, extrusion, palletisation	PROC 14
Use as laboratory reagent	PROC 15
<b>1.2 Conditions of use affecting exposure</b>	
<b>1.2.1 Control of Environmental exposure 1: Manufacturing of the substance (continuous and batch synthesis), including handling, storage and q control (ERC1)</b>	
Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.	
<b>1.2.2 Control of worker exposure: Use in closed process, no likelihood of exposure (PROC1)</b>	
	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0

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• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**1.2.3 Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	

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Other conditions affecting workers exposure	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0
<b>1.2.4 Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)</b>	
	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0
<b>1.2.5 Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)</b>	
	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0



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<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**1.2.6 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash	

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hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0
<b>1.2.7 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)</b>	
	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

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**1.2.8 Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**1.2.9 Control of worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0

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<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**1.2.10 Control of worker exposure: Use as laboratory reagent (PROC 15)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall (or lab coat); chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0

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• Respiratory Protection: No [Effectiveness Inhal: 0%]		TRA Workers 3.0
• Eye Protection: Yes (chemical goggles or safety glasses with side shields)		
<b>Other conditions affecting workers exposure</b>		
• Place of use: Indoor		TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )		TRA Workers 3.0

<b>1.3 Exposure estimation and reference to its source</b>		
<b>1.3.1 Environmental release and exposure: Manufacturing of the substance (continuous and batch synthesis), including handling, storage and q control (ERC1)</b>		
Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.		
<b>1.3.2 Worker exposure: Use in closed process, no likelihood of exposure (PROC 1)</b>		
<b>Route of exposure and type of effects</b>	<b>Exposure concentration</b>	<b>Risk characterisation</b>
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.003 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01
<b>1.3.3 Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)</b>		
<b>Route of exposure and type of effects</b>	<b>Exposure concentration</b>	<b>Risk characterisation</b>
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.137 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.027
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.027
<b>1.3.4 Worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)</b>		

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.069 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.013
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.016

**1.3.5 Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.148

**1.3.6 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**1.3.7 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268

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	3.0)	
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**1.3.8 Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.137

**1.3.9 Worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.343 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.067
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.07

**1.3.10 Worker exposure: Use as laboratory reagent (PROC 15)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.034 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic,		RCR < 0.01



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long-term		
<b>1.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES</b>		
No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.		

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**ANNEX 2**

**2. Exposure scenario (2)**

**2.1 Formulation - Formulation of chemicals and fertilizers**

**Product category / UCN code:**

PC 1, Adhesives, sealants  
PC 9a, Coatings and paints, thinners, paint removers  
PC 11, Explosives  
PC 12, Fertilizers  
PC 14, Metal surface treatment products, including galvanic and electroplating products  
PC 19, Intermediate  
PC 20, Products such as pH-regulators, flocculants, precipitants, neutralization agents  
PC 35, Washing and cleaning products (including solvent based products)  
PC 37, Water treatment chemicals  
P15900, Process regulators

**Environment contributing scenario(s):**

Formulation of chemicals and fertilizers	ERC 2
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**Worker contributing scenario(s):**

Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Treatment of articles by dipping and pouring	PROC 13
Production of preparations or articles by tableting, compression, extrusion, pelletisation	PROC 14
Use as laboratory reagent	PROC 15

**2.2 Conditions of use, affecting exposure**

**2.2.1 Control of environmental exposure 1: Formulation of chemicals and fertilizers (ERC2)**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**2.2.2 Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

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	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**2.2.3 Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	

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• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**2.2.4 Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	

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• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0
<b>2.2.5 Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)</b>	
	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

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**2.2.6 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**2.2.7 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0

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<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**2.2.8 Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	



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**Ammonium nitrate**

• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**2.2.9 Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0

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• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0
<b>2.2.10 Control of worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)</b>	
	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm2)	TRA Workers 3.0
<b>2.2.11 Control of worker exposure: Use as laboratory reagent (PROC 15)</b>	
	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	

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• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall (or lab coat); chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, safety glasses with side shields or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

## 2.3 Exposure estimation and reference to its source

### 2.3.1 Environmental release and exposure: Formulation of chemicals and fertilizers (ERC2)

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

### 2.3.2 Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.137 mg/kg bw /day</b> (TRA Workers 3.0)	RCR = 0.027
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.027

### 2.3.3 Worker exposure: Use in closed batch process (synthesis or formulation) (PROC

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**3)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.069 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.013
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.016

**2.3.4 Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.148

**2.3.5 Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**2.3.6 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**2.3.7 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**2.3.8 Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.137

**2.3.9 Worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01

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term		
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**2.3.10 Worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.343 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.067
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.07

**2.3.11 Worker exposure: Use as laboratory reagent (PROC 15)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.034 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**2.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

## ANNEX 3

**3. Exposure scenario (3)**

**3.1 Use at industrial site - Industrial use as intermediate incl. sampling, loading, filling, transfer, bagging, storage, quality control**

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**Sector of use:**

SU 8, Manufacture of bulk, large scale chemicals (including petroleum products)

SU 9, Manufacture of fine chemicals

**Product category:**

PC 19, Intermediate

**Environment contributing scenario(s):**

Industrial use as intermediate incl. sampling, loading, filling, transfer, bagging, storage, quality control	ERC 6a
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**Worker contributing scenario(s):**

Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Treatment of articles by dipping and pouring	PROC 13
Production of preparations or articles by tableting, compression, extrusion, palletisation	PROC 14
Use as laboratory reagent	PROC 15

### 3.2 Conditions of use, affecting exposure

#### 3.2.1 Control of environmental exposure 1: Industrial use as intermediate incl. sampling, loading, filling, transfer, bagging, storage, quality control (ERC6a)

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

#### 3.2.2 Control of worker exposure: Use in closed process, no likelihood of exposure (PROC 1)

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0



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<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.3 Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	

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• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.4 Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

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**3.2.5 Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.6 Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0

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<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.7 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash	

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hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.8 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

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**3.2.9 Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.10 Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	

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• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.11 Control of worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	



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• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**3.2.12 Control of worker exposure: Use as laboratory reagent (PROC 15)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall (or lab coat); chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**3.3 Exposure estimation and reference to its source**

**3.3.1 Environmental release and exposure: Use at industrial site - Industrial use as intermediate incl. sampling, loading, filling, transfer, bagging, storage, quality control (ERC6a)**

Exposure assessment and risk characterization are not required for environment, in accordance

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with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**3.3.2 Worker exposure: Use in closed process, no likelihood of exposure (PROC 1)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.003 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**3.3.3 Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.137 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.027
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.027

**3.3.4 Worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.069 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.013
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.016

**3.3.5 Worker exposure: Use in batch and other process (synthesis) where opportunity**

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**for exposure arises (PROC 4)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.148

**3.3.6 Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**3.3.7 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**3.3.8 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**3.3.9 Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.137

**3.3.10 Worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**3.3.11 Worker exposure: Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC 14)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.343 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.067

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term	3.0)	
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.07

**3.3.12 Worker exposure: Use as laboratory reagent (PROC 15)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.034 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**3.3 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

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**ANNEX 4**

**4. Exposure scenario (4)**

**4.1 Use at industrial site - Industrial use as reactive processing aid incl. sampling, loading, filling, transfer, bagging, storage, quality control**

**Sector of use:**

SU 2a, Mining (without offshore industries)  
 SU 4, Manufacture of food products  
 SU 6a, Manufacture of wood and wood products  
 SU 12, Manufacture of plastics products, including compounding and conversion  
 SU 15, Manufacture of fabricated metal products, except machinery and equipment  
 SU 19, Building and construction work  
 SU 23, Electricity, steam, gas water supply and sewage treatment

**Product category / UCN code:**

PC 1, Adhesives, sealants  
 PC 9a, Coatings and paints, thinners, paint removers  
 PC 11, Explosives  
 PC 14, Metal surface treatment products, including galvanic and electroplating products  
 PC 35, Washing and cleaning products (including solvent based products)  
 PC 37, Water treatment chemicals  
 P15900, Process regulators

**Environment contributing scenario(s):**

Industrial use as reactive processing aid incl. sampling, loading, filling, transfer, bagging, storage, quality control	ERC 6b
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**Worker contributing scenario(s):**

Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Use in batch and other process (synthesis) where opportunity for exposure arises	PROC 4
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Industrial spraying	PROC 7
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Roller application or brushing	PROC 10
Treatment of articles by dipping and pouring	PROC 13
Use as laboratory reagent	PROC 15

**4.2 Conditions of use, affecting exposure**

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**4.2.1 Control of environmental exposure: Industrial use as reactive processing aid incl. sampling, loading, filling, transfer, bagging, storage, quality control (ERC6b)**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**4.2.2 Control of worker exposure: Use in closed process, no likelihood of exposure (PROC 1)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.3 Control of worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

	Method
<b>Product (article) characteristics</b>	



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• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.4 Control of worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed batch process with occasional controlled	TRA Workers 3.0

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exposure	
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.5 Control of worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0

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• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.6 Control of worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.7 Control of worker exposure: Industrial spraying (PROC 7)**

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	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.8 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0

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<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.9 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat,	

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drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0
<b>4.2.10 Control of worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)</b>	
	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

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**4.2.11 Control of worker exposure: Roller application or brushing (PROC 10)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.12 Control of worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0



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<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**4.2.13 Control of worker exposure: Use as laboratory reagent (PROC 15)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Advanced	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall (or lab coat); chemically resistant gloves conforming to EN374 with basic employee training)	TRA Workers 3.0

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[Effectiveness Dermal: 90%]		
• Respiratory Protection: No [Effectiveness Inhal: 0%]		TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, safety glasses with side shields or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)		
<b>Other conditions affecting workers exposure</b>		
• Place of use: Indoor		TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )		TRA Workers 3.0
<b>4.3 Exposure estimation and reference to its source</b>		
<b>4.3.1 Environmental release and exposure: Industrial use as reactive processing aid incl. sampling, loading, filling, transfer, bagging, storage, quality control (ERC 6b)</b>		
Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.		
<b>4.3.2 Worker exposure: Use in closed process, no likelihood of exposure (PROC 1)</b>		
<b>Route of exposure and type of effects</b>	<b>Exposure concentration</b>	<b>Risk characterisation</b>
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.003 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01
<b>4.3.3 Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)</b>		
<b>Route of exposure and type of effects</b>	<b>Exposure concentration</b>	<b>Risk characterisation</b>
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.137 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.027
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.027
<b>4.3.4 Worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)</b>		

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.069 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.013
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.016

**4.3.5 Worker exposure: Use in batch and other process (synthesis) where opportunity for exposure arises (PROC 4)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.148

**4.3.6 Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**4.3.7 Worker exposure: Industrial spraying (PROC 7)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.028
Dermal, systemic, long-term	<b>4.286 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.837

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Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.865

**4.3.8 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**4.3.9 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**4.3.10 Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.137

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**4.3.11 Worker exposure: Roller application or brushing (PROC 10)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>2.743 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.536
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.55

**4.3.12 Worker exposure: Treatment of articles by dipping and pouring (PROC 13)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.271

**4.3.13 Worker exposure: Use as laboratory reagent (PROC 15)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.034 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**4.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**

No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

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## ANNEX 5

### 5.Exposure scenario (5)

#### 5.1 Use by professional worker - Use by professional worker (outdoor and indoor of reactive substances in open systems)

Sector of use / NACE code:

SU 1, Agriculture, forestry, fishery

SU 2a, Mining (without offshore industries)

SU 10, Formulation [mixing] of preparations and/or re-packaging (excluding alloys)

SU 19, Building and construction work

SU 23, Electricity, steam, gas water supply and sewage treatment

B8.1, Quarrying of stone, sand and clay

Product category:

PC 11, Explosives

PC 12, Fertilizer's

PC 37, Water treatment chemicals

#### Environment contributing scenario(s):

Use by professional worker (outdoor and indoor of reactive substances in open systems)	ERC 8e, ERC 8b
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#### Worker contributing scenario(s):

Use in closed process, no likelihood of exposure	PROC 1
Use in closed, continuous process with occasional controlled exposure	PROC 2
Use in closed batch process (synthesis or formulation)	PROC 3
Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact)	PROC 5
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities	PROC 8a
Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities	PROC 8b
Transfer of substance or preparation into small containers (dedicated filling line, including weighing)	PROC 9
Non industrial spraying	PROC 11
Use as laboratory reagent	PROC 15
Hand-mixing with intimate contact and only PPE available	PROC 19

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**5.2 Conditions of use, affecting exposure**

**5.2.1 Control of Environmental exposure: Use by professional worker (outdoor and indoor of reactive substances in open systems) (ERC 8e, ERC 8b)**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**5.2.2 Control of Worker exposure: Use in closed process, no likelihood of exposure (PROC 1)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed system (minimal contact during routine operations)	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.3 Control of Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**



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	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Closed continuous process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.4 Control of Worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per	TRA Workers 3.0

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**Ammonium nitrate**

hour)	
• Containment: Closed batch process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.5 Control of Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant	TRA Workers 3.0

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gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0
<b>5.2.6 Control of Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)</b>	
	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

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**5.2.7 Control of worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands (960 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.8 Control of Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: $\leq 100\%$ (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	

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• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: Semi-closed process with occasional controlled exposure	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands face (480 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.9 Control of worker exposure: Non industrial spraying (PROC 11)**

	<b>Method</b>
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	

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Keep dermal exposure to a minimum. Wear protective clothing and make sure that skin is not exposed.	
• Dermal Protection (body and hands): Yes (protective clothing (chemical suit) and chemically resistant gloves conforming to EN374, providing in total a dermal effectiveness of at least 96%). Wearing only gloves is not sufficient.	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and upper wrists (1500 cm <sup>2</sup> )	TRA Workers 3.0

**5.2.10 Control of Worker exposure: Use as laboratory reagent (PROC 15)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 8 hours	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall (or lab coat); chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0

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• Skin surface potentially exposed: One hand face only (240 cm <sup>2</sup> )	TRA Workers 3.0
<b>5.2.11 Control of Worker exposure: Hand-mixing with intimate contact and only PPE available (PROC 19)</b>	
	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: ≤ 100% (solid or liquid)	
• Concentration of substance (used for exposure estimates): Substance as such	TRA Workers 3.0
• Dustiness of material: Low	TRA Workers 3.0
<b>Amount used (or contained in articles), frequency and duration of use/exposure</b>	
• Duration of activity: < 1 hour	TRA Workers 3.0
<b>Technical and organisational conditions and measures</b>	
• General ventilation: Basic general ventilation (1-3 air changes per hour)	TRA Workers 3.0
• Containment: No	TRA Workers 3.0
• Local exhaust ventilation: no [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Occupational Health and Safety Management System: Basic	TRA Workers 3.0
<b>Conditions and measures related to personal protection, hygiene and health evaluation</b>	
• General: Work under a high standard of personal hygiene. Wash hands and face before breaks. When using the product, do not eat, drink or smoke.	
• Dermal Protection: Yes (long sleeved overall; chemically resistant gloves conforming to EN374 with basic employee training) [Effectiveness Dermal: 90%]	TRA Workers 3.0
• Respiratory Protection: No [Effectiveness Inhal: 0%]	TRA Workers 3.0
• Eye Protection: Yes (chemical goggles, or full face shield if splashing is possible, in case of using liquid (aqueous) mixtures of the substance)	
<b>Other conditions affecting workers exposure</b>	
• Place of use: Indoor	TRA Workers 3.0
• Skin surface potentially exposed: Two hands and forearms (1980 cm <sup>2</sup> )	TRA Workers 3.0

**5.3 Exposure estimation and reference to its source**

**5.3.1 Environmental release and exposure: Use by professional worker (outdoor and indoor of reactive substances in open systems) (ERC 8e, ERC 8b)**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.



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**5.3.2 Worker exposure: Use in closed process, no likelihood of exposure (PROC 1)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.003 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**5.3.3 Worker exposure: Use in closed, continuous process with occasional controlled exposure (PROC 2)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.01 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.137 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.027
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.027

**5.3.4 Worker exposure: Use in closed batch process (synthesis or formulation) (PROC 3)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.069 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.013
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.016

**5.3.5 Worker exposure: Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC 5)**

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Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.028
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.296

**5.3.6 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC 8a)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**5.3.7 Worker exposure: Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC 8b)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014
Dermal, systemic, long-term	<b>1.371 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.268
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.282

**5.3.8 Worker exposure: Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC 9)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.5 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.014

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term		
Dermal, systemic, long-term	<b>0.686 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.134
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.148

**5.3.9 Worker exposure: Non industrial spraying (PROC 11)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR = 0.028
Dermal, systemic, long-term	<b>4.284 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.837
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR = 0.865

**5.3.10 Worker exposure: Use as laboratory reagent (PROC 15)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>0.034 mg/kg bw/day</b> (TRA Workers 3.0)	RCR < 0.01
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)
Combined routes, systemic, long-term		RCR < 0.01

**5.3.11 Worker exposure: Hand-mixing with intimate contact and only PPE available (PROC 19)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Inhalation, systemic, long-term	<b>0.1 mg/m<sup>3</sup></b> (TRA Workers 3.0)	RCR < 0.01
Dermal, systemic, long-term	<b>2.829 mg/kg bw/day</b> (TRA Workers 3.0)	RCR = 0.552
Dermal, local, long-term		Qualitative (see below)
Eye, local		Qualitative (see below)

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Combined routes, systemic, long-term	RCR = 0.555
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**5.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES**  
No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.

## ANNEX 6

### 6. Exposure Scenario 6

**6.1 Consumer Use (outdoor and indoor of reactive substances in open systems) as part of specialist products, pyrotechnics and/or matches, fertilizer**

**Product category / UCN code:**

PC 1, Adhesives, sealants

PC 12, Fertilisers

S50200, Pyrotechnical products

Environment contributing scenario(s):	
Consumer Use (outdoor and indoor of reactive substances in open systems) ERC 8e, ERC 8b as part of specialist products, pyrotechnics and/or matches, fertilizer	
Consumer contributing scenario(s):	
Consumer Use (outdoor and indoor of reactive substances in open systems) PC 1 as part of specialist products, pyrotechnics and/or matches	
Consumer Use (outdoor and indoor) as part of fertilizer	PC 12

### 6.2 Conditions of use, affecting exposure

**6.2.1 Control of Environmental exposure: Consumer Use (outdoor and indoor of reactive substances in open systems) as part of specialist products, pyrotechnics and/or matches, fertilizer: ERC 8e, ERC 8b**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**6.2.2 Control of Worker exposure: Consumer Use (outdoor and indoor of reactive substances in open systems) as part of specialist products, pyrotechnics and/or matches (PC 1)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: = 0.3 g/g (default)	TRA Consumers 3.1
<b>Measures related to information and behavioural advice to consumers including personal protection and hygiene</b>	
• Adult/Child assumed: Adult	TRA Consumers 3.1
• Use frequency: Infrequent	TRA Consumers 3.1
<b>Other conditions affecting consumers exposure</b>	

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• Body parts potentially exposed: Inside hands / one hand / palm of hands (428.8 cm <sup>2</sup> )	TRA Consumers 3.1
• Dermal transfer factor: = 1	TRA Consumers 3.1

**6.2.3 Control of Worker exposure: Consumer Use (outdoor and indoor) as part of fertilizer (PC 12)**

	Method
<b>Product (article) characteristics</b>	
• Concentration of substance in mixture: = 0.5 g/g (default)	TRA Consumers 3.1
<b>Measures related to information and behavioural advice to consumers including personal protection and hygiene</b>	
• Adult/Child assumed: Adult	TRA Consumers 3.1
• Use frequency: Infrequent	TRA Consumers 3.1
<b>Other conditions affecting consumers exposure</b>	
• Body parts potentially exposed: Inside hands / one hand / palm of hands (428.8 cm <sup>2</sup> )	TRA Consumers 3.1
• Dermal transfer factor: = 1	TRA Consumers 3.1

**6.3 Exposure estimation and reference to its source**

**6.3.1 Environmental release and exposure: Consumer Use (outdoor and indoor of reactive substances in open systems) as part of specialist products, pyrotechnics and/or matches, fertilizer: ERC 8e, ERC 8b**

Exposure assessment and risk characterization are not required for environment, in accordance with the ECHA Guidance on information requirements and chemical safety assessment, Part B: Hazard assessment, Version 2.1, December 2011.

**6.3.2 Worker exposure: Consumer Use (outdoor and indoor of reactive substances in open systems) as part of specialist products, pyrotechnics and/or matches (PC 1)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Dermal, systemic, long-term	<b>0.858 mg/kg bw/day</b> (TRA Consumers 3.1)	RCR = 0.335
Combined routes, systemic, long-term		RCR = 0.335

**6.3.3 Worker exposure: Consumer Use (outdoor and indoor) as part of fertilizer (PC 12)**

Route of exposure and type of effects	Exposure concentration	Risk characterisation
Dermal, systemic, long-term	<b>1.429 mg/kg bw/day</b> (TRA Consumers 3.1)	RCR = 0.558

**Extended SAFETY DATA SHEET**  
**In accordance with Regulation (EC) 1907/2006 (REACH), Annex II, amended**  
**with Regulation (EC) 2020/878**

**Ammonium nitrate**

Combined routes, systemic, long-term		RCR = 0.558
<p><b>6.4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES</b> No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.</p>		