

Ammonium nitrate

Revision date:
2014-02-12
Version No. 3
Revision No. 6

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1. Product identifier

Trade name: *Ammonium nitrate.*

Chemical name: *Nitric acid ammonium salt.*

INDEX number as listed in Annex VI of CLP: *Not listed.*

ID number of the C&L inventory: *Not listed.*

CAS number: *6484-52-2*

EC number: *229-347-8*

REACH registration number: *01-2119490981-27-xxxx*

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

1.2.1. Uses:

Uses by workers in industrial settings:

- 1. Manufacturing of the substance, including handling, storage and quality control.*
- 2. Sampling, loading, filling, transfer, dumping, bagging of substance (charging/discharging) at (non-) dedicated facilities. Industrial/professional settings.*
- 3. Storage.*
- 4. Transfer of substance into small containers (dedicated filling line, including weighing). Industrial/professional setting.*
- 5. Quality control.*
- 6. Use of ammonium nitrate in the manufacturing of formulations for adhesives and sealants, explosives, fertilizers and water treatment chemicals.*
- 7. Treating or coating of seed with fertilizer containing ammonium nitrate.*
- 8. Use of ammonium nitrate as an intermediate to synthesize other substances.*

Uses by professional workers:

- 9. Spraying.*
- 10. Professional use of fertilizers containing ammonium nitrate – liquid fertigation at open field (non industrial spraying).*
- 11. Professional use of fertilizers containing ammonium nitrate – liquid fertigation in the soil.*
- 12. Professional use of fertilizers containing ammonium nitrate – fertigation at open field.*
- 13. Professional use of fertilizers containing ammonium nitrate – outdoor mixing.*
- 14. Professional use of fertilizers containing ammonium nitrate – indoor mixing.*
- 15. Professional use of fertilizers containing ammonium nitrate – greenhouse liquid fertigation in the soil.*
- 16. Professional use of fertilizers containing ammonium nitrate – greenhouse liquid fertigation (non industrial spraying).*

Uses by consumers:

- 17. Consumer end use – fertilization at open field*
- 18. Consumer end use – indoor use of fertilizers*
- 19. Consumer end use – matches and fireworks*

1.2.2. Uses advised against: None.

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1.3. Details of the supplier of the safety data sheet:

Manufacturer: *AB Achema*

Full address: *Jonalaukio k., Ruklos sen., LT55550*

Country: *Lithuania*

Tel. Nr.: *+ 370 349 56465*

URL website: www.achema.com

Person responsible for the Safety Data Sheet (with e-mail address): *Vidas Bersėnas, vidasber@achema.com*

1.4. Emergency telephone number:

Emergency phone number: *+370 5 2362052 or 112.*

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance

2.1.1. Classification in accordance with Regulation No. 1272/2008: *Oxidising solids Cat. 3, eye irritation Cat. 2*

Hazard statement(s): *H272 May intensify fire; oxidiser.*
 H319 Causes serious eye irritation.

2.1.2. Classification in accordance with Directive 67/548: *Oxidising, Irritant*

Risk phrase(s): *R8 Contact with combustible material may cause fire.*
 R36 Irritating to eyes.

2.1.3. Additional information: *Full text of safety phrases is in chapter 16.*

2.2. Label elements

2.2.1. Labelling in accordance with Regulation No. 1272/2008:

Hazard pictogram(s):



Signal word: *Warning*

Hazard statement(s): *H272 May intensify fire; oxidiser.*
 H319 Causes serious eye irritation.

Precautionary statement(s):

P210 "Keep away from heat/ sparks/open flames/hot surfaces. — No smoking. Keep away from heat".

P220 "Keep/Store away from clothing/reducing agents/acids/alkali/sulphur/chlorates/chlorides/nitrates/permanganates/powder of metals and materials containing metals as follows: copper, nickel, cobalt, zinc and their alloys/combustible materials".

P221 "Take any precaution to avoid mixing with combustibles, reducing agents, acids, alkali, sulphur, chlorates, chlorides, nitrates, permanganates, powder of metals and materials containing metals as follows: copper, nickel, cobalt, zinc and their alloys".

P370+P378 "In case of fire: Use water for extinction".

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P264 “Wash hands thoroughly after handling”.
P280 “Wear protective gloves/protective clothing/eye protection/face protection”.
P305+P351+P338 “IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing”.

2.3 Other hazards.

2.3.1. PBT/vPvB criteria: According to Annex XIII of Regulation (EC) No 1907/2006, no PBT and vPvB assessment has been conducted since ammonium nitrate is inorganic.

2.3.2. Other hazards: None known.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

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

CAS Nr.	EC Nr.	ID No. in accordance with Regulation (EB) No. 1272/2008	REACH registration No.	Purity, %	IUPAC name	Classification in compliance with Regulation (EC) No. 1272/2008 (CLP)
6484-52-2	229-347-8	Not listed	01-2119490981-27-xxxx	99,3 %	Ammonium nitrate	Oxidising solids Cat. 3, eye irritation Cat. 2 ; H272; H319;

CAS Nr.	EC Nr.	ID No. in accordance with Regulation (EB) No. 1272/2008	REACH registration No.	Purity, %	IUPAC name	Classification in compliance with 67/548/EC Directive
6484-52-2	229-347-8	Not listed	01-2119490981-27-xxxx	99,3 %	Ammonium nitrate	O, Xi R8, R36

4. FIRST-AID MEASURES

4.1. Description of first aid measures

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 vapors are intensively inhaled.

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.

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

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irritation develops and persists.

Ingestion: *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 vapors are intensively inhaled.*

4.2 Most important symptoms and effects

Acute effects: *eye irritation.*

Delayed effects: *none known.*

4.3 Indication of any immediate medical attention and special treatment needed

Note to physician: *methaemoglobinaemia.*

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable: *non-combustible. Water.*

Not suitable: *combustible material.*

5.2. Special hazards arising from the substance or mixture

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, NO₂ etc.), ammonia (NH₃), amines.

5.3. Advice for firefighters

No special measures required. In the event of fire, wear a self-contained breathing apparatus and a chemical protective suit.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

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.

6.2. Environmental precautions

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.

6.3. Methods and material for containment and cleaning up

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.

6.4. Reference to other sections

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

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Technical measures/ Precautions:

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. Avoid contamination by any source including metals, dust and organic materials. Keep away from moisture.

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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.

7.2. Conditions for safe storage, including any incompatibilities

Packed and unpacked product must be stored in closed, covered, dry, ventilated and clean storehouses. The floor of buildings should be constructed of not-readily combustible material such as concrete, preferably without bitumen joints or renderings. Internal pits, drains and gutters should be excluded. At intermediate store, harbour facility or farm the product in bulk could be stored in silos or closed bins (in accordance with “Handbook for the safe storage of ammonium nitrate based fertilizers” published under the joint auspices of IFA and EFMA).

Outside storage of the products allowed, providing the product is protected against precipitation, moisture (rain, snow, avoid the bag standing in water or water accumulation on the bag) and direct sunlight. The product cannot be exposed to temperature above 30°C. Unpacked product cannot be stored outside.

Smoking is prohibited on product storage sites. Product must be kept separately from heat sources and open fire, protected from combustible substances, reducing agents, alkali, sulphur, chlorates, chlorides, chromates, nitrites, permanganates, metal powder (especially zinc), substances containing copper, nickel, cobalt, zinc and their alloys, oxidizing substances.

Fertilizers stores should be single storey and without basement or cellar. The capacity of stores and the size of heaps, bays and other areas should conform to national regulations.

Big bags must be kept in vertical position, stored on pallets without nails or sharp wood chips able to damage the big bag. The product in 500 kg big bags must be piled in no more than 4 layers. When product is in transit, 500 kg big bags can be shortly (up to 9 days) piled in 10 layers.

Avoid storage in hot premises or direct sunshine, package damaging. Prevent the fertilizer from being polluted with combustible (e.g. lubricants) or incompatible substances (fertilizers containing sulphur, urea, NPK, NP and NK fertilizers containing urea, reducing agents, strong acids and bases, metal powders, chromates, zinc, copper and copper alloys, chlorates); ensure product protection against atmosphere and humidity.

Bulk and packed product stack height must maintain at least 1-meter distance from storage eaves, barks and lamp holders. Product stack height is subject to storage site layout, however to ensure loading and unloading mechanisms to operate without interference in case of emergency, at least 1 meter space around each stack of product must be left.

Sufficient distance must be left between the stacks of bulk product, to prevent contamination with other substances. When urea is stored in the same building care should be exercised to ensure that the material cannot come into contact with the fertilizer at any time including in a fire.

Farmers using the fertilizer must ensure they will not be stored with hay, straw, corn, diesel-based lubricants, etc.

Technical measures/ Storage conditions:

Keep in the original container. Keep container tightly closed in a cool, dry, well-ventilated place. Keep product away from heat, sparks, flame and other sources of ignition, out of direct sunlight and away from combustible and reducing materials and other incompatible materials.

Packaging materials:

Stainless steel (304). Synthetic material.

Non suitable: Zinc, Copper

Incompatible products: Combustible, oxidizing, reducing materials, strong acids and bases, sulphur, chlorates, chlorides, chromates, nitrites, permanganates, metal powder (especially zinc), substances containing copper, nickel, cobalt, zinc and their alloys substances, fertilizers containing sulphur, urea, NPK, NP and NK fertilizers.

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8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1. Control parameters

Regulated occupational exposure limit values: *none*.

8.2. Exposure controls

8.2.1. Appropriate engineering controls: *none required. Use of adequate ventilation is good industrial practice. 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:

Eye (face) protection: *chemical goggles or face shield.*

Skin protection

Hand protection: *protective (heat resistant) gloves.*

Other protection: *working clothes.*

Respiratory protection: *respiratory protection.*

Hygiene measures: *wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing.*

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance: *transparent/ white deliquescent crystals (orthorhombic at room temperature) or white granules.*

Odour: *odourless.*

pH: *at least 5,0 (of water solution 100g/l at 20°C).*

Melting/Freezing temperature: *169,6-169,7 °C (from peer-reviewed handbook).*

Boiling temperature: *no boiling point, decomposes > 210 °C.*

Flash-point: *not relevant, as the substance is an inorganic solid.*

Flammability: *non flammable (based on molecular structure).*

Explosive properties: *Ammonium nitrate fertilizers falling under UN 2067 do not have explosive properties.*

Vapour pressure: *considered negligible (based on melting and boiling point).*

Relative density (D4 (20)): *1.72 (from peer-reviewed handbook).*

Solubility in water: *>100 g/l at 20°C (from peer-reviewed handbook).*

Partition coefficient n-octanol/water: *not relevant as the substance is inorganic, considered to be low (based on high water solubility).*

Auto ignition temperature: *No auto-ignition (based on structure and melting point)*

Decomposes temperature: *> 210 °C.*

Viscosity: *not applicable to solids.*

Oxidizing properties: *For transport, ammonium nitrate fertilisers (UN2067) are considered oxidizing substances. Transport classification: Class 5.1; PG III.*

9.2 Other information: *none.*

10. STABILITY AND REACTIVITY

10.1. Reactivity

Stable under recommended storage and handling conditions (see section 7, handling and storage).

10.2. Chemical stability

Stable under recommended storage and handling conditions (see section 7, handling and storage).

10.3. Possibility of hazardous reactions

When heated, decomposition products.

10.4. Conditions to avoid

Decomposes on heating. Confinement must be avoided.

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10.5. Incompatible materials

Combustible, oxidizing, reducing materials, strong acids and bases, sulphur, chlorates, chlorides, chromates, nitrites, permanganates, metal powder (especially zinc), substances containing copper, nickel, cobalt, zinc and their alloys substances, fertilizers containing sulphur, urea, NPK, NP and NK fertilizers.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. In case of fire, nitrogen oxides (NO, NO₂).

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

11.1.1. Acute toxicity:

Acute oral toxicity: LD₅₀: 2950 mg/kg bw (OECD 401).

Acute dermal toxicity: LD₅₀: > 5000 mg/kg bw (OECD 402).

Acute inhalation toxicity: LC₅₀: > 88,8 mg/l (no guideline followed).

11.1.2. Skin irritation or/and sensitization: not irritating (OECD 404).

11.1.2.1. Eye irritation: irritating (OECD 405).

11.1.2.2. Skin sensitization: not sensitizing (OECD 429, with magnesium nitrate, nitric acid ammonium calcium salt, sodium nitrate).

11.1.4. Mutagenicity: negative (OECD 471, 473, with nitric acid ammonium calcium salt). Negative (OECD 476, with potassium nitrate).

11.1.5. Carcinogenicity: not carcinogenic (OECD 453, with ammonium sulfate).

11.1.6. Reproductive toxicity: oral 28-day NOAEL ≥ 1500 mg/kg bw/day (OECD 422, with potassium nitrate).

11.1.7. Sub-acute toxicity: oral 28- day NOAEL ≥ 1500 mg/kg bw/day (OECD 422, with potassium nitrate).

Oral 52- week NOAEL = 256 mg/kg bw/day (OECD 453, with ammonium sulfate).

Inhalation 2- weeks NOAEL ≥ 185 mg/m³ (OECD 412).

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Fish (short-term): 48-h LC₅₀: 447 mg/l (no guideline followed).

Fish (long-term): no data.

Daphnia magna (short-term): 48-h EC₅₀: 490 mg/l (no guideline followed, with potassium nitrate).

Daphnia magna (long-term): no data.

Algae: 10-d EC₅₀: > 1700 mg/l (seawater, no guideline followed, performed with potassium nitrate).

Inhibition of microbial activity: 3-h EC₅₀: >1000 mg/l, NOEC: 180 mg/l (OECD 209, with sodium nitrate).

12.2 Persistence and degradability

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 N₂, N₂O and NH₃, 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.

12.3 Bioaccumulative potential

Octanol- water partition coefficient (K_{ow}): 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).

12.4 Mobility in soil

Adsorption coefficient: low potential for adsorption (based on substance properties).

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12.5 Results of PBT and vPvB assessment

According to Annex XIII of Regulation (EC) No 1907/2006, no PBT and vPvB assessment has been conducted since ammonium nitrate is inorganic.

13. DISPOSAL CONSIDERATIONS

13.1 Waste from residues:

Waste from residues: *Depending on degree and nature of contamination dispose of by use as fertilizer on farm, as raw material or liquid fertilizer, or to an authorised waste facility. Do not empty into drains. Dispose of this material and its container in a safe way and in accordance with all applicable local and national regulations.*

Package waste disposal: *The bags should be empty by shaking to remove as much as possible of its contents. If approved by local authorities, empty bags may be disposed of as non-hazardous material or returned for recycling. Do not remove label until package is thoroughly cleaned.*

14. TRANSPORT INFORMATION

14.1. UN Number: 2067

14.2. Proper shipping name: Ammonium nitrate

14.3. Transport hazard classes: 5.1

14.4. Packaging group: III

14.5. Other information: none.

15. REGULATORY INFORMATION

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

- Regulation (EC) 1907/2006 (REACH);
- Regulation (EC) No 1272/2008 of the European parliament and of the council on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006;
- Commission regulation (EU) No 453/2010, amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH);
- in compliance with applicable Classification and Labeling Procedure for Hazardous Chemical Substances and Preparations;
- in compliance with applicable Procedure of Safety Data Sheet Requirements and Supply thereof to Professional Users;
- in compliance with HN23 Maximum Allowable Concentrations of Hazardous Chemical Substances and Preparations in Working Environment. General Requirements;
- in compliance with HN36 Banned and Restricted Substances;
- in compliance with applicable Regulations for Workers' Protection against the Impact of Chemical Factors and Regulations for Workers' Protection against Carcinogenous and Mutagenous Impacts;
- in compliance with applicable General Regulations for Storage of Hazardous Chemical Substances and Preparations;
- in compliance with applicable Law on Waste Disposal of the Republic of Lithuania;
- in compliance with applicable Law on Package and Package Waste Handling of the Republic of Lithuania;
- in compliance with applicable Rules on Waste Disposal;
- in compliance with applicable Rules on Labeling of Items (Products) to be Sold in Lithuania and Referring Price thereof;
- in compliance with 67/548/EEC Directive;
- in compliance with European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR);
- in compliance with The International Rule for Transport of Dangerous Substances by Railway (RID);

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- in compliance with *The International Maritime Dangerous Goods (IMDG)*.

Additional information provided on the label of the chemical preparation package:

Visual signs No. 4 „Protect from sun“, No. 6 „Protect from rain“ in compliance with LST EN ISO 780.

15.2 Chemical safety assessment

In accordance with REACH Article 14, a Chemical Safety Assessment has been carried out for this substance.

16. OTHER INFORMATION

There is no additional data that may be important to consumer’s safety and health, as well as environment protection.

Used abbreviations:

H272- May intensify fire; oxidiser;

H319 - Causes serious eye irritation;

P210 - Keep away from heat/ sparks/open flames/hot surfaces. — No smoking. Keep away from heat;

P220- Keep/Store away from clothing/reducing agents/acids/alkali/sulphur/chlorates/chlorides/nitrates/permananates/powder of metals and materials containing metals as follows: copper, nickel, cobalt, zinc and their alloys/combustible materials;

P221- Take any precaution to avoid mixing with combustibles, reducing agents, acids, alkali, sulphur, chlorates, chlorides, nitrates, permananates, powder of metals and materials containing metals as follows: copper, nickel, cobalt, zinc and their alloys;

P370+P378 - In case of fire: Use water for extinction;

P264 - Wash hands thoroughly after handling;

P280 - Wear protective gloves/protective clothing/eye protection/face protection;

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

O- oxidiser;

Xi - irritant;

R8 - Contact with combustible material may cause fire;

R36 - Irritating to eyes;

ADR- European Agreement on Dangerous Goods by Road;

IATA- International Air Transport Organization;

IMO- International Marine Organization;

RID- Regulations Concerning the International Carriage of Dangerous Goods by Rail;

SMGS- International Agreement on Carriage of Loads by Rail.

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

Version: 3

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ANNEX

Exposure scenarios:

- 1 Exposure scenario (1): Manufacturing of the substance including handling, storage and quality controls;
- 2 Exposure scenario (2): Industrial use for formulation of preparations/articles, intermediate use and end-use in industrial settings;
- 3 Exposure scenario (3): Professional use in formulation of preparations and end-use;
- 4 Exposure scenario (4): Consumer end-use of fertilizers and matches/fireworks.

1 Exposure scenario (1)	
Manufacturing of the substance including handling, storage and quality controls	
Use descriptors related to the life cycle stage	SU8/9 PROC1/2/3/8a/8b/9/14/15 ERC1
Name of contributing environmental scenario (1) and corresponding ERC	1. Manufacturing of substances (ERC1)
List of names of contributing worker scenarios (2) and corresponding PROC	<ol style="list-style-type: none"> 1. Use in closed process, no likelihood of exposure (PROC1) 2. Manufacturing in a closed continuous process, with occasional exposure (PROC2) 3. Use in closed batch process (synthesis or formulation) (PROC3) 4. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC8a) 5. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC8b) 6. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9) 7. Production of preparations* or articles by tableting, compression, extrusion, pelletisation (PROC14) 8. Use as laboratory reagent (PROC15)
2.1 Contributing scenario (1) controlling environmental exposure	
Environmental release during manufacturing ERC1 An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
2.2 Contributing scenario (2) controlling worker exposure for manufacturing of the substance including handling, storage and quality controls	
All Process Categories are covered by this contributing scenario as all Operational Conditions	

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(OCs) and Risk Management Measures (RMMs) are identical. PROC1/2/3/8a/8b/9/14/15	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure	Solid, low dustiness
Amounts used	
Amounts used at a workplace (per task or per shift); note: sometimes this information is not needed for assessment of worker's exposure	Not applicable.
Frequency and duration of use/exposure	
Duration per task/activity (e.g. hours per shift) and frequency (e.g. single events or repeated) of exposure	More than 4 hours per day
Human factors not influenced by risk management	
Particular conditions of use, e.g. body parts potentially exposed as a result of the nature of the activity	Not applicable
Other given operational conditions affecting workers exposure	
Other given operational conditions: e.g. technology or process techniques determining the initial release of substance from process into workers environment; room volume, whether the work is carried out outdoors/indoors, process conditions related to temperature and pressure.	Indoors
Technical conditions and measures at process level (source) to prevent release	
Process design aiming to prevent releases and hence exposure of workers; this in particular includes conditions ensuring rigorous containment; performance of containment to be specified (e.g. by quantification of residual losses or exposure)	Not applicable
Technical conditions and measures to control dispersion from source towards the worker	
Engineering controls, e.g. exhaust ventilation, general ventilation; specify effectiveness of measure	1. Containment as appropriate 2. Good standard of general ventilation
Organisational measures to prevent /limit releases, dispersion and exposure	
Specific organizational measures or measures needed to support the	Not applicable

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<p>functioning of particular technical measures (e.g. training and supervision). Those measures need to be reported in particular for demonstrating strictly controlled conditions (to justify exposure based waiving).</p>	
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p>	
<p>Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant)</p>	<p>1. Chemical goggles</p>
<p>3. Exposure information and reference to its source</p>	
<p>Information for contributing scenario 1</p>	
<p>An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.</p>	
<p>Information for contributing scenario 2</p>	
<p>A qualitative approach was used to conclude safe use for workers. The leading toxicological effect is eye irritation (local endpoint), for which no DNEL can be derived as no dose-response information is available. As minimal systemic effects were only noted at such high levels of substance that humans are normally not exposed to (see DNELs), a quantitative assessment is not considered necessary.</p>	
<p>4. Guidance to DU to evaluate whether he works inside the boundaries set by the ES</p>	
<p>No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.</p>	
<p>5. Additional good practice advice beyond the REACH CSA</p>	
<p>Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets. Such as:</p> <ul style="list-style-type: none"> - Containment as appropriate; - Minimize number of staff exposed; - Segregation of the emitting process; - Effective contaminant extraction; - Good standard of general ventilation; - Minimization of manual phases; - Avoidance of contact with contaminated tools and objects; - Regular cleaning of equipment and work area; - Management/supervision in place to check that RMMs in place are being used correctly and OCs followed; - Training staff on good practice; - Good standard of personal hygiene. 	

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1. Exposure scenario (2)	
Industrial use for formulation of preparations/articles, intermediate use and end-use in industrial settings.	
Use descriptors related to the life cycle stage	SU3/10 PC1/11/12/19/37 PROC1/2/3/5/8a/8b/9/13/15 ERC2/6a
Name of contributing environmental scenario (1) and corresponding ERC	1. Formulation of preparations (ERC2) 2. Industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a)
List of names of contributing worker scenarios (2) and corresponding PROC	1. Use in closed process, no likelihood of exposure (PROC1) 2. Use in closed, continuous process with occasional controlled exposure (PROC2) 3. Use in closed batch process (synthesis or formulation) (PROC3) 4. Mixing or blending in batch processes for formulation of preparations and articles (multistage and/or significant contact) (PROC5) 5. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC8a) 6. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC8b) 7. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9) 8. Treatment of articles by dipping and pouring (PROC13) 9. Use as laboratory reagent (PROC15)
2.1 Contributing scenario (1) controlling environmental exposure	
Formulation of preparations (ERC2) and industrial use resulting in manufacture of another substance (use of intermediates) (ERC6a) An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
2.2 Contributing scenario (2) controlling worker exposure for industrial use for formulation of preparations/articles, intermediate use and end-use in industrial settings.	
All Process Categories are covered by this contributing scenario as all Operational Conditions (OCs) and Risk Management Measures (RMMs) are identical. PROC1/2/3/5/8a/8b/9/13/15	
Product characteristic	
Product related conditions, e.g. the	Solid, low dustiness

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concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure	Liquid
Amounts used	
Amounts used at a workplace (per task or per shift); note: sometimes this information is not needed for assessment of worker’s exposure	Not applicable
Frequency and duration of use/exposure	
Duration per task/activity (e.g. hours per shift) and frequency (e.g. single events or repeated) of exposure	More than 4 hours per day
Human factors not influenced by risk management	
Particular conditions of use, e.g. body parts potentially exposed as a result of the nature of the activity	Not applicable
Other given operational conditions affecting workers exposure	
Other given operational conditions: e.g. technology or process techniques determining the initial release of substance from process into workers environment; room volume, whether the work is carried out outdoors/indoors, process conditions related to temperature and pressure.	Indoors
Technical conditions and measures at process level (source) to prevent release	
Process design aiming to prevent releases and hence exposure of workers; this in particular includes conditions ensuring rigorous containment; performance of containment to be specified (e.g. by quantification of residual losses or exposure)	Not applicable
Technical conditions and measures to control dispersion from source towards the worker	
Engineering controls, e.g. exhaust ventilation, general ventilation; specify effectiveness of measure	<ol style="list-style-type: none"> 1. Containment as appropriate 2. Good standard of general ventilation
Organisational measures to prevent /limit releases, dispersion and exposure	
Specific organizational measures or measures needed to support the functioning of particular technical measures (e.g. training and	Not applicable

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<p>supervision). Those measures need to be reported in particular for demonstrating strictly controlled conditions (to justify exposure based waiving).</p>	
<p>Conditions and measures related to personal protection, hygiene and health evaluation</p>	
<p>Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant)</p>	<p>1. Chemical goggles</p>
<p>3 Exposure information and reference to its source</p>	
<p>Information for contributing scenario 1</p>	
<p>An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.</p>	
<p>Information for contributing scenario 2</p>	
<p>A qualitative approach was used to conclude safe use for workers. The leading toxicological effect is eye irritation (local endpoint), for which no DNEL can be derived as no dose-response information is available. As minimal systemic effects were only noted at such high levels of substance that humans are normally not exposed to (see DNELs), a quantitative assessment is not considered necessary.</p>	
<p>4 Guidance to DU to evaluate whether he works inside the boundaries set by the ES</p>	
<p>No additional risk management measures, besides those that are mentioned above, are needed to guarantee safe use for workers.</p>	
<p>5 Additional good practice advice beyond the REACH CSA</p>	
<p>Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets. Such as:</p> <ul style="list-style-type: none"> - Containment as appropriate; - Minimize number of staff exposed; - Segregation of the emitting process; - Effective contaminant extraction; - Good standard of general ventilation; - Minimization of manual phases; - Avoidance of contact with contaminated tools and objects; - Regular cleaning of equipment and work area; - Management/supervision in place to check that RMMs in place are being used correctly and OCs followed; - Training staff on good practice; - Good standard of personal hygiene; 	

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1 Exposure scenario (3)	
Professional use in formulation of preparations and end-use	
Use descriptors related to the life cycle stage	SU22 PC12 PROC1/2/8a/8b/9/11/15/19 ERC8b/8e
Name of contributing environmental scenario (1) and corresponding ERC	1. Wide dispersive indoor use of reactive substances in open systems (ERC8b) 2. Wide dispersive outdoor use of reactive substances in open systems (ERC8e)
List of names of contributing worker scenarios (2) and corresponding PROC	1. Use in closed process, no likelihood of exposure (PROC1) 2. Use in closed, continuous process with occasional controlled exposure (PROC2) 3. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities (PROC8a) 4. Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities (PROC8b) 5. Transfer of substance or preparation into small containers (dedicated filling line, including weighing) (PROC9) 6. Non industrial spraying (PROC11) 7. Use as laboratory reagent (PROC15) 8. Hand-mixing with intimate contact and only PPE available (PROC19)
2.1 Contributing scenario (1) controlling environmental exposure	
Wide dispersive indoor use of reactive substances in open systems (ERC8b) and wide dispersive outdoor use of reactive substances in open systems (ERC8e). An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
2.2 Contributing scenario (2) controlling worker exposure for professional use in formulation of preparations and end-use	
All Process Categories are covered by this contributing scenario as all Operational Conditions (OCs) and Risk Management Measures (RMMs) are identical. PROC1/2/8a/8b/9/11/15/19	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure	Solid, low dustiness Liquid, >25% substance in the product

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Amounts used	
Amounts used at a workplace (per task or per shift); note: sometimes this information is not needed for assessment of worker’s exposure	Not applicable
Frequency and duration of use/exposure	
Duration per task/activity (e.g. hours per shift) and frequency (e.g. single events or repeated) of exposure	More than 4 hours per day
Human factors not influenced by risk management	
Particular conditions of use, e.g. body parts potentially exposed as a result of the nature of the activity	Not applicable
Other given operational conditions affecting workers exposure	
Other given operational conditions: e.g. technology or process techniques determining the initial release of substance from process into workers environment; room volume, whether the work is carried out outdoors/indoors, process conditions related to temperature and pressure.	Indoors or outdoors
Technical conditions and measures at process level (source) to prevent release	
Process design aiming to prevent releases and hence exposure of workers; this in particular includes conditions ensuring rigorous containment; performance of containment to be specified (e.g. by quantification of residual losses or exposure)	Not applicable
Technical conditions and measures to control dispersion from source towards the worker	
Engineering controls, e.g. exhaust ventilation, general ventilation; specify effectiveness of measure	<ol style="list-style-type: none"> 1. Containment as appropriate 2. Good standard of general ventilation 3. Avoid splashing. Use specific dispensers and pumps specifically designed to prevent splashes/spills/ exposure to occur
Organisational measures to prevent /limit releases, dispersion and exposure	
Specific organizational measures or measures needed to support the functioning of particular technical measures (e.g. training and supervision). Those measures need to be reported in particular for demonstrating strictly controlled	Not applicable.

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conditions (to justify exposure based waiving).	
Conditions and measures related to personal protection, hygiene and health evaluation	
Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant)	1. Chemical goggles
3 Exposure information and reference to its source	
Information for contributing scenario 1	
An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
Information for contributing scenario 2	
A qualitative approach was used to conclude safe use for workers. The leading toxicological effect is eye irritation (local endpoint), for which no DNEL can be derived as no dose-response information is available. As minimal systemic effects were only noted at such high levels of substance that humans are normally not exposed to (see DNELs), a quantitative assessment is not considered necessary.	
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.	
5 Additional good practice advice beyond the REACH CSA	
Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets. Such as:	
<ul style="list-style-type: none"> - Containment as appropriate; - Minimize number of staff exposed; - Segregation of the emitting process; - Effective contaminant extraction; - Good standard of general ventilation; - Minimization of manual phases; - Avoidance of contact with contaminated tools and objects; - Regular cleaning of equipment and work area; - Management/supervision in place to check that RMMs in place are being used correctly and OCs followed; - Training staff on good practice; - Good standard of personal hygiene; 	

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1 Exposure scenario (4)	
Consumer end-use of fertilizers and matches/fireworks	
Use descriptors related to the life cycle stage	SU21 PC11/12 ERC8b/8e/10a
Name of contributing environmental scenario (1) and corresponding ERC	1. Wide dispersive indoor use of reactive substances in open systems (ERC8b) 2. Wide dispersive outdoor use of reactive substances in open systems (ERC8e) 3. Wide dispersive outdoor use of long-life articles and materials with low release (ERC10a)
List of names of contributing consumer scenarios (2) and corresponding PC and sub-product categories if applicable	1. Explosives (PC11) 2. Fertilizers (PC12)
2.1 Contributing scenario (1) controlling environmental exposure	
Wide dispersive indoor use of reactive substances in open systems (ERC8b), wide dispersive outdoor use of reactive substances in open systems (ERC8e) and wide dispersive outdoor use of long-life articles and materials with low release (ERC10a). An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
2.2 Contributing scenario (2) consumer end-use of fertilizers and matches/fireworks	
All Product Categories are covered by this contributing scenario as all Operational Conditions (OCs) and Risk Management Measures (RMMs) are identical. Exposure to eye irritating dilutions can occur during consumer use of fertilizers (PC12). No exposure is expected from the use of matches/fireworks (PC11).	
Product characteristic	
Product related conditions, e.g. the concentration of the substance in a mixture, the physical state of that mixture (solid, liquid; if solid: level of dustiness), package design affecting exposure	Solid, low dustiness Liquid Products containing ≥10% and <10%.
Amounts used	
Amounts used per event	Not applicable
Frequency and duration of use/exposure	
Duration of exposure per event and frequency of events; please note: Tier 1 exposure assessment usually refers to external event exposure, without taking into account the duration and frequency of the event (see Guidance Chapter R.15);	Not applicable
Human factors not influenced by risk management	
Particular conditions of use, e.g. body parts potentially exposed; population potentially	Not applicable

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exposed (adults, children)	
Other given operational conditions affecting workers exposure	
Other operational conditions e.g. room volume, air exchange rate, outdoor or indoor use	Indoors or outdoors
Conditions and measures related to information and behavioral advice to consumers	
Safety advice to be communicated to consumers in order to control exposure, e.g. technical instruction, behavioral advice;	Avoid splashing
Conditions and measures related to personal protection and hygiene	
Personal protection, e.g. wearing of gloves, face protection, full body dermal protection, goggles, respirator; specify effectiveness of measure; specify the suitable material for the PPE (where relevant) and advise how long the protective equipment can be used before replacement (if relevant).	<ol style="list-style-type: none"> 1. If $\geq 10\%$ of ammonium nitrate: Use chemical goggles 2. If $< 10\%$ of ammonium nitrate: no personal protection needed 3. Instructions addressed to the consumer via product labeling
3 Exposure information and reference to its source	
Information for contributing scenario 1	
An environmental assessment has not been performed as the substance does not meet the criteria for being classified as dangerous for the environment.	
Information for contributing scenario 2	
A qualitative approach was used to conclude safe use for consumers. The leading toxicological effect is eye irritation (local endpoint), for which no DNEL can be derived as no dose-response information is available. As minimal systemic effects were only noted at such high levels of substance that humans are normally not exposed to (see DNELs), a quantitative assessment is not considered necessary.	
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/consumers for use of fertilizers: If $\geq 10\%$ ammonium nitrate: Use chemical goggles If $< 10\%$ ammonium nitrate: No personal protection needed	

The end of Safety Data Sheet.

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