

MATERIAL SAFETY DATA SHEET: PULAN®

In compliance with Regulation (EC) No. 1907/2006 with further amendments.



Version: 6.1

Creation date: 14.05.2008

Update: 09.07.2013

| SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING | |
|---|---|
| 1.1. Product identifier | |
| Commercial product name | PULAN® |
| Synonyms | Ammonium nitrate 34,4N |
| 1.2. Relevant identified uses of the substance or mixture and uses advised against | |
| Ammonium nitrate is used as a mineral fertiliser in agriculture. | |
| 1.3. Details of the supplier of the safety data sheet | |
| Company name | Grupa Azoty Zakłady Azotowe „Puławy” S.A. |
| Company address | Al. Tysiąclecia Państwa Polskiego 13; 24-110 Puławy; Poland |
| Company telephone number | +48 (81) 886 34 31; +48 (81) 565 30 00 fax.: +48 (81) 565 28 56 |
| E-mail | dyspozytor@pulawy.com |
| 1.4. Emergency telephone number | |
| Company shift dispatcher: + 48 (81) 565 20 00 (24 hours / 7 days a week) Emergency telephone number: 112 | |
| SECTION 2. HAZARDS IDENTIFICATION | |
| 2.1. Classification of the substance or mixture | |
| Classification according to 1999/45/WE | |
| Hazard symbol(s) | O – Oxidising Xi – Irritant |
| R-phrases | R8, R36 |
| Classification according to (EC) 1272/2008 | |
| Hazard Class and Category Code(s) | Ox. Sol. 3 - Oxidising solids, category 3 Eye Irrit. 2 - Eye irritation, category 2 |
| Hazard statement(s) | H272, H319 |
| Environmental hazards | |
| Product is not classified as hazardous substance for environment. | |
| Health hazards | |
| Skin contact | Prolonged contact with skin may cause redness. |
| Eye contact | Causes eye irritation. Eye redness and eye pain may occur. |
| Ingestion | Ingestion of large amount of ammonium nitrate may cause gastro - intestinal disturbances leading to vomiting, diarrhea, methemoglobin creation and thus cyanosis may occur. |
| Inhalation | Inhalation of ammonium nitrate dusts may cause respiratory tract irritation. |

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| | |
|---|--|
| Long term effects | Within a few hours after ingestion methemoglobin creation (methemoglobinemia) may occur leading further to cyanosis (blue coloration of skin, nails and lips). |
| Adverse physicochemical effects | Non flammable product. However, ammonium nitrate can assist other material to burn and may intensify fire. Decomposition of pure substance starts at temperature above melting point (see item 9.1). In confined spaces thermal decomposition may lead to explosion. Substances mentioned in Section 10.5. may catalyze decomposition process and thus fire – explosion hazard increases. If involved in a fire, ammonium nitrate decomposes with the release of toxic fumes of nitrogen oxides (NO _x) and ammonia (NH ₃). |
| 2.2. Label elements | |
| Hazard pictogram(s) | GHS03 GHS07 |
| 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; P221: Take any precaution to avoid mixing with combustibles...; 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; P337 + P313: If eye irritation persists: Get medical advice/attention. |
| 2.3. Other hazards | |
| PBT and vPvB assessment is not relevant and it is not required for the substances of inorganic type. No fulfillment of PBT and vPvB criteria. | |
| SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS | |
| 3.1. Substances | |
| Not relevant | |
| 3.2. Mixtures | |
| Product identifier | PULAN® |
| Classification according to 67/548/EEC | |

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| Chemical name | % (w/w) | EC Number | Registration number | Symbol | R phrases |
|-----------------------|---------|-----------|-----------------------|--------|-----------|
| Ammonium nitrate (V) | ≥ 98% | 229-347-8 | 01-2119490981-27-0025 | O; Xi | R8; R36 |
| Magnesium nitrate (V) | ≤ 2% | 233-826-7 | 01-2119491164-38-0008 | O | R8 |

Classification according to (EC) 1272/2008

| Chemical name | % (w/w) | EC Number | Registration number | Hazard Class | Hazard statement |
|-----------------------|---------|-----------|-----------------------|-------------------------------|------------------|
| Ammonium nitrate (V) | ≥ 98% | 229-347-8 | 01-2119490981-27-0025 | Oxid. Solid 3 Eye Irrit. 2 | H272 H319 |
| Magnesium nitrate (V) | ≤ 2% | 233-826-7 | 01-2119491164-38-0008 | Oxid. Solid 3 | H272 |

Full text of R-phrases and Hazard statements mentioned in this Section are listed in Section 16.

SECTION 4. FIRST AID MEASURES

4.1. Description of first aid measures

| | |
|--------------|--|
| General | Provide sufficient general and local ventilation. Installation of safety showers and eyewash stations is recommended at workplace. |
| Inhalation | Remove victim from the area of exposure to fresh air. Obtain medical attention if symptoms of poisoning occur. |
| Ingestion | If swallowed, give plenty of water to drink. Do not induce vomiting. Ingestion of small amounts of ammonium nitrate usually does not cause intoxication. Ingestion of large amount of ammonium nitrate may cause gastro - intestinal disturbances and methemoglobin creation. In some cases low blood pressure is also observed. Obtain medical attention. |
| Skin contact | Take off contaminated clothing. Wash contaminated skin with plenty of water. Get medical advice if symptoms of irritation occur. |
| Eye contact | Immediately flush eyes with plenty of water for about 15 minutes. Avoid strong water stream due to the risk of mechanical damage to cornea. Obtain ophthalmologists' assistance. |

4.2. Most important symptoms and effects, both acute and delayed

Causes eye irritation; ammonium nitrate dusts may lead to respiratory tract irritation and skin redness. Ingestion may induce methemoglobin creation (methemoglobinemia) and lead further to cyanosis (blue coloration of skin, nails and lips).

4.3. Indication of any immediate medical attention and special treatment needed

Professional medical attention must be provided in case of clinical signs of methemoglobinemia and 100 %

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oxygen must be given to the victim for breathing and 1g of ascorbic acid administered intravenously. If physician is present at the scene, then methylene blue must be given to the victim (dose ca. 10 – 50 ml).

SECTION 5. FIREFIGHTING MEASURES

5.1. Extinguishing media

| | |
|------------------------------|--|
| Suitable extinguishing media | Not flammable. Use large amounts of water if involved in fire. |
|------------------------------|--|

| | |
|--------------------------------|---|
| Unsuitable extinguishing media | Do not use foam and dry chemical extinguishers. |
|--------------------------------|---|

5.2. Special hazards arising from the substance or mixture

For more details see item 2.1.

5.3. Advice for firefighters

Wear full chemical resistant protective clothing and positive pressure, self contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

| | |
|-------------------------------|---|
| Suitable protective equipment | Depending on exposure route use: <ul style="list-style-type: none">• protective glasses (according to EN 166 standard)• dust masks (according to EN 149 standard)• protective gloves (according to EN 388 standard)• protective goggles (according to EN 166 standard) |
|-------------------------------|---|

| | |
|----------------------|--|
| Emergency procedures | In case of high concentration of ammonium nitrate dusts evacuate the area of exposure. |
|----------------------|--|

For emergency responders

Wear protective clothing, dust masks, protective gloves, protective goggles and in case of high temperatures use self contained breathing apparatus.

6.2. Environmental precautions

Avoid contamination of watercourses and drains with large amount of ammonium nitrate.

6.3. Methods and material for containment and cleaning up

| | |
|--|---|
| Recommendations for preventing the spread of the spill and its elimination | Small spill and leak: Vacuum or sweep up material. Large spill and leak: Vacuum or sweep up material. Rinse affected area with large amounts of water. Reuse collected ammonium nitrate as a fertiliser or give it away for further disposal. |
|--|---|

6.4. Reference to other sections

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

SECTION 7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Avoid inhalation of dust. Handle with care in accordance with good industrial hygiene and safety practice. Use

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personal protective equipment. Ensure proper cleanness of transport means. In order to prevent humidification avoid product exposure to atmospheric conditions and work in dry, clean and well – ventilated areas. Avoid open flame and high temperatures.

7.2. Conditions for safe storage, including any incompatibilities

Ammonium nitrate should be stored in original packaging only. The storage buildings should be clean, dry and well ventilated. Procedures should be in place to prevent against theft or access by unauthorized persons. In a warehouse with ammonium nitrate it is strongly forbidden to smoke, weld, use open flame and store materials that can react violently with ammonium nitrate or are combustible, e.g.: reducing agents, metal oxides, powdered metals, alkalis, acids, organic materials (e.g. straw, oil, grease). Protect from direct sunlight and heating above 30°C.

In one storage room no more than 300 tonnes of ammonium nitrate are allowed to be stored. The number of rooms in the warehouse is unlimited. Fertiliser in packages not exceeding 50kg can be stored in stacks having maximum twelve layers. Elastic containers (big bag type) which do not exceed mass of 600 kg should be stored in stacks consisting of maximum two layers.

PULAN[®] should be stored on the floor made of incombustible materials and protected from dampness. The minimum distance of stacks from warehouse walls should not be less than 0,2 m and not less than 1,5 m from heat sources.

Do not store ammonium nitrate with other fertilisers.

Note: See section 9 for physical and chemical properties.

7.3. Specific end use(s)

See the attached exposure scenarios for more details.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

| | |
|---|-----------------|
| Indicative occupational exposure limit values | Not established |
|---|-----------------|

| | |
|-------------------------|-----------------|
| Biological limit values | Not established |
|-------------------------|-----------------|

Ammonium nitrate DNEL (for workers)

| | | |
|------------------------------------|----------------------------|------------------------------|
| Chronic toxicity; systemic effects | Exposure route: dermal | DNEL: 21,3 mg/kg bw/day |
| Chronic toxicity; systemic effects | Exposure route: inhalation | DNEL: 37,6 mg/m ³ |

Ammonium nitrate PNEC

| | |
|--------------------|------------|
| Freshwater | 0,45 mg/l |
| Marine water | 0,045 mg/l |
| Accidental release | 4,5 mg/l |
| STP | 18 mg/l |

8.2 Exposure controls

See the attached exposure scenarios for more details.

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

| | |
|---|---|
| Appearance | Solid, white or yellowish granules |
| Odour | None |
| Odour threshold | Not relevant |
| pH | ≥ 4,5 |
| Melting point/freezing point | Ammonium nitrate: 169,6 °C (p = 1013 hPa) |
| Initial boiling point and boiling range | Decomposes at 210 °C |
| Flash point | Not relevant (mixture is non – flammable) |
| Evaporation rate | No data |
| Flammability | Mixture is non – flammable; may intensify fire and oxidation |
| Upper/lower explosion limits | Not relevant (mixture is not explosive) |
| Vapour pressure | No data |
| Vapour density | Not relevant |
| Relative density | 1,72 at 20 °C (water = 1) |
| Solubility In water | > 100 g/l at 20 °C |
| Partition coefficient: n-octanol/water | Not relevant (inorganic mixture) |
| Auto-ignition temperature | Not relevant (mixture is non – flammable) |
| Decomposition temperature | ≥ 210 °C |
| Viscosity | Not relevant (solid mixture) |
| Explosive properties | Non - explosive accordingly to the laboratory test, which was carried out in compliance with Regulation (EC) No. 2003/2003 of the European Parliament and Council of 13 October 2003 relating to fertilisers. Substance resistance to detonation transfer is reduced in presence of impurities and/or at high temperature. Heating in enclosed space, especially in presence of materials mentioned in item 10.5. may cause violent uncontrolled reaction or explosion. |
| Oxidising properties | Ammonium nitrate is characterized with oxidizing properties. |

9.2. Other information

| | |
|--------------------------------|--|
| Solubility in organic solvents | Good solubility in pyridine, methanol, liquid ammonia. Limited solubility is observed in solvents such as: ethanol, acetone. |
|--------------------------------|--|

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

Ammonium nitrate is unsteady material on heating to high temperature (see item 5.2.). Ammonium nitrate is characterized with oxidizing properties and therefore reacts violently with combustible and/or reducing agents (see item 10.5). Aqueous solutions of ammonium nitrate are known to act like a weak acids.

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| 10.2. Chemical stability | | | | | | | | | | | | | | | |
|--|---|-----------------|-------------------------------|-----------|--------|-------------------------|---------------------|---|--------------|-----------|-----|-------------------------------|--------------|-----|-------------------------------|
| Product is stable under normal conditions. | | | | | | | | | | | | | | | |
| 10.3. Possibility of hazardous reactions | | | | | | | | | | | | | | | |
| Reacts violently with combustible materials and/or reducing agents (see item 10.5.). | | | | | | | | | | | | | | | |
| 10.4. Conditions to avoid | | | | | | | | | | | | | | | |
| Open flame, heating above melting point (see item 9.1.), exposure to atmospheric conditions (see item 7.2), contact with incompatible materials (see item 10.5). | | | | | | | | | | | | | | | |
| 10.5. Incompatible materials | | | | | | | | | | | | | | | |
| Keep away from incompatible materials such as: reducing agents, metal oxides, powdered metals, alkalis, acids, zinc, copper and its alloys, organic materials (e.g. straw, oil, grease). | | | | | | | | | | | | | | | |
| 10.6. Hazardous decomposition products | | | | | | | | | | | | | | | |
| Toxic nitrogen oxides (NO _x) and ammonia (NH ₃) | | | | | | | | | | | | | | | |
| SECTION 11. TOXICOLOGICAL INFORMATION | | | | | | | | | | | | | | | |
| 11.1. Information on toxicological effects | | | | | | | | | | | | | | | |
| Acute toxicity; | <table border="1"><thead><tr><th>Ingredient name</th><th>Route</th><th>Specie(s)</th><th>Result</th></tr></thead><tbody><tr><td rowspan="3">Ammonium nitrate (100%)</td><td>Inhalation (30min.)</td><td>-</td><td>Not relevant</td></tr><tr><td>Ingestion</td><td>rat</td><td>LD₅₀: 2950 mg/kg</td></tr><tr><td>Skin contact</td><td>rat</td><td>LD₅₀: 5000 mg/kg</td></tr></tbody></table> | Ingredient name | Route | Specie(s) | Result | Ammonium nitrate (100%) | Inhalation (30min.) | - | Not relevant | Ingestion | rat | LD ₅₀ : 2950 mg/kg | Skin contact | rat | LD ₅₀ : 5000 mg/kg |
| Ingredient name | Route | Specie(s) | Result | | | | | | | | | | | | |
| Ammonium nitrate (100%) | Inhalation (30min.) | - | Not relevant | | | | | | | | | | | | |
| | Ingestion | rat | LD ₅₀ : 2950 mg/kg | | | | | | | | | | | | |
| | Skin contact | rat | LD ₅₀ : 5000 mg/kg | | | | | | | | | | | | |
| Skin corrosion/irritation; | There is no evidence of skin irritation. Prolonged contact may cause skin redness. | | | | | | | | | | | | | | |
| Serious eye damage/irritation; | Ammonium nitrate causes eye irritation. | | | | | | | | | | | | | | |
| Respiratory or skin sensitisation | There is no evidence for skin or respiratory tract sensitization. No classification. | | | | | | | | | | | | | | |
| Germ cell mutagenicity | There is no evidence for genotoxicity. No classification. | | | | | | | | | | | | | | |
| Carcinogenicity | There is no evidence for carcinogenicity. No classification. | | | | | | | | | | | | | | |
| Reproductive toxicity | There is no evidence for reproductive toxicity. No classification. | | | | | | | | | | | | | | |
| STOT (<i>Specific target organ Toxicity</i>) - single exposure | Not classified. | | | | | | | | | | | | | | |
| STOT-repeated exposure | Not classified. | | | | | | | | | | | | | | |
| Aspiration hazard | There is no evidence for aspiration hazards. | | | | | | | | | | | | | | |
| Symptoms related to the physical, chemical and toxicological characteristics | | | | | | | | | | | | | | | |

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| Inhalation | Inhalation of ammonium nitrate dusts may cause respiratory tract irritation. | | | | | | | | | |
|---|---|---|--------|--------------------------|---------------------------|---|--------------------------|-----------------------|-----------------------------------|--|
| Ingestion | Ingestion of large amount of ammonium nitrate may cause gastrointestinal disturbances leading to vomiting, diarrhea, methemoglobin creation possibly resulting in cyanosis. | | | | | | | | | |
| Skin contact | Prolonged contact may cause skin redness. | | | | | | | | | |
| Eye contact | Contact with eye may cause eye irritation. | | | | | | | | | |
| Delayed and immediate effects as well as chronic effects from short and long-term exposure | | | | | | | | | | |
| Within a few hours after ingestion methemoglobin creation (methemoglobinemia) may occur leading further to cyanosis (blue coloration of skin, nails and lips). | | | | | | | | | | |
| SECTION 12. ECOLOGICAL INFORMATION | | | | | | | | | | |
| 12.1. Toxicity | | | | | | | | | | |
| Short-term (acute) toxicity: | | | | | | | | | | |
| <table border="1"><thead><tr><th>Ingredient name</th><th>Test</th><th>Result</th></tr></thead><tbody><tr><td>Ammonium nitrate (100%)</td><td>Fish</td><td>LC₅₀ (48 h): 447 mg/l</td></tr><tr><td>Potassium nitrate (100%)</td><td>Aquatic invertebrates</td><td>EC₅₀ (48 h): 490 mg/l</td></tr></tbody></table> | Ingredient name | Test | Result | Ammonium nitrate (100%) | Fish | LC ₅₀ (48 h): 447 mg/l | Potassium nitrate (100%) | Aquatic invertebrates | EC ₅₀ (48 h): 490 mg/l | |
| Ingredient name | Test | Result | | | | | | | | |
| Ammonium nitrate (100%) | Fish | LC ₅₀ (48 h): 447 mg/l | | | | | | | | |
| Potassium nitrate (100%) | Aquatic invertebrates | EC ₅₀ (48 h): 490 mg/l | | | | | | | | |
| Toxicity to algae: | | | | | | | | | | |
| <table border="1"><thead><tr><th>Ingredient name</th><th>Test</th><th>Result</th></tr></thead><tbody><tr><td>Potassium nitrate (100%)</td><td>Algae</td><td>EC₅₀: 1700 mg/l</td></tr></tbody></table> | Ingredient name | Test | Result | Potassium nitrate (100%) | Algae | EC ₅₀ : 1700 mg/l | | | | |
| Ingredient name | Test | Result | | | | | | | | |
| Potassium nitrate (100%) | Algae | EC ₅₀ : 1700 mg/l | | | | | | | | |
| Toxicity to aquatic microorganism: | | | | | | | | | | |
| <table border="1"><thead><tr><th>Ingredient name</th><th>Test</th><th>Result</th></tr></thead><tbody><tr><td>Sodium nitrate (100%)</td><td>Aquatic micro - organisms</td><td>EC₅₀: 1000 mg/l EC₁₀: 180 mg/l</td></tr></tbody></table> | Ingredient name | Test | Result | Sodium nitrate (100%) | Aquatic micro - organisms | EC ₅₀ : 1000 mg/l EC ₁₀ : 180 mg/l | | | | |
| Ingredient name | Test | Result | | | | | | | | |
| Sodium nitrate (100%) | Aquatic micro - organisms | EC ₅₀ : 1000 mg/l EC ₁₀ : 180 mg/l | | | | | | | | |
| 12.2. Persistence and degradability | | | | | | | | | | |
| Biodegradability in case of inorganic chemicals is not required to Regulation (EC) 1907/2006. | | | | | | | | | | |
| 12.3. Bioaccumulative potential | | | | | | | | | | |
| Bioaccumulation does not occur in case of ammonium nitrate. | | | | | | | | | | |
| 12.4. Mobility in soil | | | | | | | | | | |
| Based on physico-chemical properties, ammonium nitrate is predicted to have a high mobility in soil. | | | | | | | | | | |
| 12.5. Results of PBT and vPvB assessment | | | | | | | | | | |

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| | |
|---|---|
| PBT and vPvB assessment is not relevant and it is not required for the substances of inorganic type. | |
| 12.6. Other adverse effects | |
| Ammonium nitrate is not listed in the Regulation (EC) 1005/2009 as the substance potentially depleting the ozone layer. | |
| SECTION 13. DISPOSAL CONSIDERATIONS | |
| 13.1. Waste treatment methods | |
| Waste treatment methods | Reuse as a mineral fertiliser or give it away for further disposal. Avoid disposal into drains and sewers. |
| Package waste disposal | Dispose in accordance with national and local environmental regulations. Empty containers must be handed over to a licensed waste disposal contractor (package waste code 15 01 02). |
| Waste code | 02 01 09 - Agrochemical waste other than those mentioned in 02 01 08 |
| Special precautions | See Section 7 for more details. |
| Relevant Community provisions | Disposal of this product any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. |
| SECTION 14. TRANSPORT INFORMATION | |
| 14.1. UN number | |
| 2067 | |
| 14.2. UN proper shipping name | |
| Ammonium nitrate based fertiliser | |
| 14.3. Transport hazard class(es) | |
| 5.1 | |
| 14.4. Packing group | |
| III | |
| 14.5. Environmental hazards | |
| Not applicable. | |
| 14.6. Special precautions for user | |
| Follow rules and guidelines of the traffic code. | |
| 14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code | |
| Product name | Not applicable. |
| Ship type | Not applicable. |
| Pollution Category | Not applicable. |
| SECTION 15. REGULATORY INFORMATION | |

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

Authorisation

Material is not subject to authorization according to Annex XIV of Regulation (EC) No. 1907/2006.

Restrictions

Ammonium nitrate is subject to following restrictions on the manufacture, placing on the market and use according to Annex XVII of EC Regulation No. 1907/2006:

1. Shall not be placed on the market for the first time after 27 June 2010 as a substance, or in mixtures that contain more than 28 % by weight of nitrogen in relation to ammonium nitrate, for use as a solid fertiliser, straight or compound, unless the fertiliser complies with the technical provisions for ammonium nitrate fertilisers of high nitrogen content set out in Annex III to Regulation (EC) No 2003/2003 of the European Parliament and of the Council.
2. Shall not be placed on the market after 27 June 2010 as a substance, or in mixtures that contain 16 % or more by weight of nitrogen in relation to ammonium nitrate except for supply to:
 - a) downstream users and distributors, including natural or legal persons licensed or authorised in accordance with Council Directive 93/15/EEC;
 - b) farmers for use in agricultural activities, either full time or part time and not necessarily related to the size of the land area. For the purposes of this subparagraph:
 - (i) 'farmer' shall mean a natural or legal person, or a group of natural or legal persons, whatever legal status is granted to the group and its members by national law, whose holding is situated within Community territory, as referred to in Article 299 of the Treaty, and who exercises an agricultural activity;
 - (ii) 'agricultural activity' shall mean the production, rearing or growing of agricultural products including harvesting, milking, breeding animals and keeping animals for farming purposes, or maintaining the land in good agricultural and environmental condition as established under Article 5 of Council Regulation (EC) No 1782/2003;
 - c) natural or legal persons engaged in professional activities such as horticulture, plant growing in greenhouses, maintenance of parks, gardens or sport pitches, forestry or other similar activities.
3. However, for the restrictions in paragraph 2, Member States may until 1 July 2014, for socioeconomic reasons, apply a limit of up to 20 % by weight of nitrogen in relation to ammonium nitrate for substances and mixtures placed on the market within their territories. They shall inform the Commission and other Member States thereof.

Other UE regulations

Ammonium nitrate is listed in Part 1 of Annex I to the Regulation (EU) 2012/18 of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (also known as the Seveso III Directive).

Ammonium nitrate is listed in Annex II to the Regulation (EU) No 98/2013 on the marketing and use of explosives precursors.

15.2. Chemical safety assessment

Grupa Azoty Zakłady Azotowe „Puławy” S.A. prepared a relevant chemical safety assessment for ammonium nitrate.

SECTION 16. OTHER INFORMATION

Changes made

Change of company name.

Legend to abbreviations and acronyms:

Index number – is the nine-digit code that is assigned to chemical substances in part 3 of Annex VI (EC) 1272/2008

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EC number - is the seven-digit code that is assigned to chemical substances that are commercially available within the European Union

CAS number - unique numerical identifier assigned by the Chemical Abstracts Service to every chemical substance

DNEL - is the level of exposure to a substance above which humans should not be exposed.

PNEC - is the concentration below which exposure to a substance is not expected to cause adverse effects for environmental.

LC₅₀ - in toxicology, the median lethal dose, LD₅₀ (abbreviation for "Lethal Dose, 50%"), LC₅₀ (Lethal Concentration, 50%) of a toxic substance or radiation is the dose required to kill half the members of a tested population after a specified test duration.

LD₅₀ - in toxicology, lethal dose (LD) is an indication of the lethality of a given chemical substance. It represents the amount of a material, which results in death of 50% of a group of test animals.

EC₅₀ - effective concentration of a toxic substance at 50% mortality rate of the affected community being observed

EC₁₀ - effective concentration of a toxic substance at 10% mortality rate of the affected community being observed

Log K_{OW} - is defined as the ratio of the molar concentrations of a chemical in n-octanol and water, in dilute solution.

K_{OC} - is defined as the ratio of the molar concentrations of a chemical in organic carbon and water.

Indicative Occupational exposure limit value - 8 hours - Maximum acceptable average concentration limit value (time-weighted average) of an air contaminant in respiratory air. An occupational exposure limit value is either a level limit value or a ceiling limit value. Measured or calculated in relation to a reference period of 8 hours time-weighted average (TWA).

Indicative Occupational exposure Limit value - Short term [mg/m³] Maximum acceptable average concentration limit value (time-weighted average) of an air contaminant in respiratory air. An occupational exposure limit value is either a level limit value or a ceiling limit value. Short-term exposure limit (STEL). A limit value above which exposure should not occur and which is related to a 15-minute period unless otherwise specified.

| | |
|-------------|--|
| Instruction | Personnel involved in dealing with the substance should be trained and work according to relevant HSE guidelines. Drivers who are responsible for transportation of the substance should be professionally trained in requirements of ADR. |
| References | Chemical Safety Reports for ammonium nitrate and as well for magnesium nitrate were applied during MSDS preparation. |

R-phrases referred to under headings 2 – 15

R8 - contact with combustible material may cause fire

R36 - irritating to eyes.

Hazard statements referred to under headings 2 – 15

H272: May intensify fire; oxidizer.

H319: Causes serious eye irritation

NOTE:

The information in this Safety Data Sheet is given in good faith and belief in its accuracy based on our knowledge of the substance/mixture concerned at the date of publication. It does not imply the acceptance of any legal liability or just responsibility whatsoever by the Company for the consequences of its use or misuse in any particular circumstances.

Annexes:

Exposure scenario No 1: Manufacturing of the substance including safe handling, storage and quality control.

Exposure scenario No 2: Industrial and professional use of ammonium nitrate for formulation of mixture, as

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intermediate and as end-use substance.

Exposure scenario No 3: Consumer application of ammonium nitrate as a fertilizer or matches/fireworks component.

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| MANUFACTURING OF THE SUBSTANCE INCLUDING SAFE HANDLING, STORAGE AND QUALITY CONTROL | |
|---|--------------|
| 1. Sector of use (SU): | |
| SU8 - Manufacture of bulk, large scale chemicals (including petroleum products) SU9 - Manufacture of fine chemicals | |
| 2. Process category (PROC): | |
| PROC 1 - Use in closed process, no likelihood of exposure PROC 2 - Use in closed, continuous process with occasional controlled exposure PROC 3 - Use in closed batch process (synthesis or formulation) PROC 8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC 8b - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities PROC 9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC 14 - Production of mixtures or articles by tableting, compression, extrusion, pelletisation PROC 15 - Use as laboratory reagent | |
| 3. Product category (PC): | |
| Not relevant. | |
| 4. Environmental release category (ERC): | |
| ERC1 - Manufacture of substances | |
| 5. Processes and activities covered by the exposure scenario | |
| Manufacturing of the substance (including: safe handling, loading/unloading and storing, quality control (sampling, probing testing, filling, dosing, maintenance works, clean down etc.) in closed continuous mode. The abovementioned tasks and activities are performed mainly indoor with industrial settings. | |
| 6. Product characteristics: | |
| Physical state of the substance/product | Solid |
| Volatility of the substance/product | Low |
| Concentration of substance in product | Not relevant |
| 7. Amounts used: | |
| >2,8 ton/day – > 1000 ton/year per site | |
| 8. Frequency and duration of use/exposure: | |
| Duration of worker exposure: > 4 hours/day | |
| 9. Technical conditions and measures to prevent or avoid human exposure | |
| Rigorously contained production process and thus all processing operations must take place using enclosed, automated technological equipment. General ventilation is also required. | |
| 10. Conditions and measures related to personal protection, hygiene and health evaluation: | |

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| Eye protection | In case of contact with product use chemical splash safety goggles according to EN 166 standard. |
| Skin and body protection | Protective clothing. |
| Hand protection | Protective gloves (according to EN 388 standard). |
| Respiratory protection | In case of exposure to ammonium nitrate dust use dust masks (according to EN 149 standard). |
| Other recommended protection measures | Apply integrated risk management system on site. |
| 11. Frequency and duration of environmental release: | |
| In this case the relevant estimation was not performed. | |
| 12. Technical conditions and measures to reduce or avoid environmental release | |
| In general, this Exposure Scenario considers tasks and activities, which are performed in closed system. Therefore no likelihood of exposure/release, or with occasional controlled exposure/release. All technological devices should be regularly controlled and maintained to avoid uncontrolled discharge of ammonium nitrate. | |
| 13. Conditions and measures related to municipal sewage treatment plant: | |
| Average effluent flow rate | 2000 m ³ /day (default assumption) |
| Average receiving river flow rate | ≥ 18000 m ³ /day, (default assumption) |
| Efficiency of STP | about 95% |
| 14. Conditions and measures related to waste management | |
| Sludge obtained from water purification, should be stored (on site) at relevant landfill site. | |
| 15. Exposure estimation: | |
| Exposure Assessment Method | In this case the relevant estimation was not performed. However, quantitative assessment is available. |

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| INDUSTRIAL AND PROFESSIONAL USE OF AMMONIUM NITRATE FOR FORMULATION OF MIXTURES, AS INTERMEDIATE AND AS END-USE SUBSTANCE |
|--|
| 1. Sector of use (SU): |
| SU3 - Industrial uses (Uses of substances as such or in mixtures at industrial sites) SU10 - Formulation [mixing] of mixtures and/or re-packaging (excluding alloys) SU22 - Professional uses: Public domain (administration, education, entertainment, services, craftsmen) |
| 2. Process category (PROC): |
| PROC1 - Use in closed process, no likelihood of exposure PROC2 - Use in closed, continuous process with occasional controlled exposure PROC3 - Use in closed batch process (synthesis or formulation) PROC5 - Mixing or blending in batch processes for formulation of mixtures and articles (multistage and/or significant contact) PROC8a - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at non-dedicated facilities PROC8b - Transfer of substance or mixture (charging/discharging) from/to vessels/large containers at dedicated facilities PROC9 - Transfer of substance or mixture into small containers (dedicated filling line, including weighing) PROC11 - Non industrial spraying PROC13 - Treatment of articles by dipping and pouring. PROC15 - Use as laboratory reagent PROC19 - Hand-mixing with intimate contact and only PPE available. |
| 3. Product category (PC): |
| PC1 - Adhesives, sealants PC11 - Explosives PC12 - Fertilisers PC19 - Intermediate PC37 - Water treatment chemicals |
| 4. Environmental release category (ERC): |
| ERC2 - Formulation of mixtures ERC6a - Industrial use resulting in manufacture of another substance (use of intermediates) ERC8b - Wide dispersive indoor use of reactive substances in open systems ERC8e - Wide dispersive outdoor use of reactive substances in open systems |
| 5. Processes and activities covered by the exposure scenario: |
| The exposure scenario is strictly connected with ammonium nitrate applications as end-use substance, intermediate or as raw material for formulation of some mixtures. In most cases when ammonium nitrate is applied by industry all processing operations are performed in closed system and the mentioned operations can be continuous or batch. Technological equipment containing ammonium nitrate can be placed outdoor or indoor depending on manufacturing scale, but usually loading and unloading steps take place outdoor. In most cases industrial operations are performed automatically, however some tasks and activities i.e. sampling or maintenance works must be carried out manually. Typical tasks and activities for professional settings: handling, loading/unloading, filling, dosing, mixing or applying of some preparations with ammonium nitrate i.e. fertilisers including also spraying. |

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| 6. Product characteristics: | |
| Physical state of the substance/product | Solid |
| Volatility of the substance/product | Low |
| Concentration of substance in product | ≥ 25% |
| 7. Amounts used: | |
| >2,8 ton/day – > 1000 ton/year per site | |
| 8. Frequency and duration of use/exposure: | |
| Duration of worker exposure: > 4 hours/day Frequency of workers exposure: ≤ 240 days/ year | |
| 9. Technical conditions and measures to prevent or avoid human exposure | |
| Workers exposure to ammonium nitrate is usually negligible, because most operations are performed in remote mode. However in case exposure to the substance exists, then personal protective equipment must be used. General ventilation is also required. | |
| 10. Conditions and measures related to personal protection, hygiene and health evaluation: | |
| Eye protection | In case of contact with product use chemical splash safety goggles according to EN 166 standard. |
| Skin and body protection | Protective clothing. |
| Hand protection | Protective gloves (according to EN 388 standard). |
| Respiratory protection | In case of exposure to ammonium nitrate dust use dust masks (according to EN 149 standard). |
| Other recommended protection measures | Apply integrated risk management system on site. |
| 11. Frequency and duration of environmental release: | |
| In this case the relevant estimation was not performed. | |
| 12. Technical conditions and measures to reduce or avoid environmental release | |
| In general, this Exposure Scenario considers tasks and activities, which are performed in closed system. Therefore no likelihood of exposure/release, or with occasional controlled exposure/release. All technological devices should be regularly controlled and maintained to avoid uncontrolled discharge of ammonium nitrate. In case of ammonium nitrate applications as a fertiliser the substance release is intentional and it is considered as a controlled operation. | |
| 13. Conditions and measures related to municipal sewage treatment plant: | |
| Average effluent flow rate | 2000 m ³ /day (default assumption) |
| Average receiving river flow rate | ≥ 18000 m ³ /day, (default assumption) |
| Efficiency of STP | about 95% |
| Additional information | If no access to STP, then biological water treatment is recommended before environmental discharging. |

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| 14. Conditions and measures related to waste management | |
| Sludge obtained from water purification, should be stored (on site) at relevant landfill site. | |
| 15. Exposure estimation: | |
| Exposure Assessment Method | In this case the relevant estimation was not performed. However, quantitative assessment is available. |

EXPOSURE SCENARIO No 3: PULAN®

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| CONSUMER APPLICATION OF AMMONIUM NITRATE AS A FERTILIZER OR MATCHES/FIREWORKS COMPONENT. | |
|---|--|
| 1. Sector of use (SU): | |
| SU21 - Consumer uses: Private households (= general public = consumers) | |
| 2. Process category (PROC): | |
| Not relevant | |
| 3. Product category (PC): | |
| PC11 - Explosives PC12 - Fertilisers | |
| 4. Environmental release category (ERC): | |
| ERC8b - Wide dispersive indoor use of reactive substances in open systems ERC8e - Wide dispersive outdoor use of reactive substances in open systems ERC10a - Wide dispersive outdoor use of long-life articles and materials with low release | |
| 5. Processes and activities covered by the exposure scenario | |
| The exposure scenario is strictly connected with consumer applications of ammonium nitrate: as a fertiliser in agriculture works or matches/fireworks component. Consumers applications are characterized with intentional and controlled release of ammonium nitrate to the environment. These involves activities carried out indoor or outdoor depending on situation. | |
| 6. Product characteristics: | |
| Physical state of the substance/product | Solid |
| Volatility of the substance/product | Low |
| Concentration of substance in product | Not relevant |
| 7. Amounts used: | |
| Not relevant | |
| 8. Frequency and duration of use/exposure: | |
| In general periodic exposure. Duration of worker exposure: > 4 hours/day | |
| 9. Technical conditions and measures to prevent or avoid human exposure | |
| If ammonium nitrate is applied indoor then general ventilation is required. If there is a risk of direct contact with the substance then personal protective equipment is required (goggles, gloves, dust masks). | |
| 10. Conditions and measures related to personal protection, hygiene and health evaluation: | |
| Eye protection | In case of contact with product use safety goggles according to EN 166 standard. |
| Skin and body protection | Protective clothing. |
| Hand protection | Protective gloves (according to EN 388 standard). |

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| Respiratory protection | In case of exposure to ammonium nitrate dust use dust masks (according to EN 149 standard). |
| 11. Frequency and duration of environmental release: | |
| In this case the relevant estimation was not performed. | |
| 12. Technical conditions and measures to reduce or avoid environmental release | |
| Consumers applications of ammonium nitrate, especially as a fertiliser are characterized with intent and controlled release of the substance therefore no environmental hazards. | |
| 13. Conditions and measures related to municipal sewage treatment plant: | |
| Average effluent flow rate | 2000 m ³ /day (default assumption) |
| Average receiving river flow rate | ≥ 18000 m ³ /day, (default assumption) |
| Efficiency of STP | about 95% |
| 14. Conditions and measures related to waste management | |
| Not relevant | |
| 15. Exposure estimation: | |
| Exposure Assessment Method | In this case the relevant estimation was not performed. However, quantitative assessment is available. |