MATERIAL SAFETY DATA SHEET

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Trade name: NOxy ®(otherwise AdBlue®)

The former commercial product name: AdBlue®

1.2 Relevant identified uses of substance or mixture and uses advised against

1.2.1 Relevant identified uses

NOxy ®(otherwise AdBlue®) is used to selectively reduce emissions of nitrogen oxides from diesel engines which have been equipped with Selective Catalytic Reduction (SCR) systems.

1.2.2 Uses advised against

No data available.

1.3 Details on the supplier of the safety data sheet

Producer: Grupa Azoty ZAK S.A.

Address: PO Box 163; ul. Mostowa 30A;

47-220 Kędzierzyn-Koźle; Poland

Telephone No: (+48 77) 481 20 00 (operator)

Person responsible for safety data sheet: karta_nawozy@grupaazoty.com

1.4 Emergency telephone numbers (in Poland)

Company’s Dispatch Office: (+48 77) 481-34-01

Emergency system: 112

Police: 997

Fire Dept.: 998

Medical aid: 999

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 Classification according to EC Regulation № 1272/2008

The product does not meet the classification criteria of that Regulation.
2.2 Label elements

Not applicable (no labelling requirements).

2.3 Other hazards

No data available.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

<table>
<thead>
<tr>
<th>Name of substance</th>
<th>REACH registration number</th>
<th>EC number</th>
<th>CAS number</th>
<th>IUPAC name</th>
<th>Conc. [% (m/m)]</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>01-2119463277-33-0005</td>
<td>200-315-5</td>
<td>57-13-6</td>
<td>Urea</td>
<td>31.8÷33.2</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

4.1 Description of first aid measures

**Eyes**
Flush eye(s) immediately with plenty of tampered water. Consult an eye specialist in case of any/every eye contact.

**Skin**
Wash the affected area with plenty of water.

**Inhalation**
Evacuate the affected person from the place of exposure and provide access of fresh air.

**Ingestion**
Evacuate the affected person from the place of exposure and arrange the recovery position; keep warm and at rest. Give 2-3 glassfuls of water to drink. Provide medical attention.

4.2 Most important symptoms and effects, both acute and delayed

No data available.

4.3 Indication of any immediate medical attention and special treatment needed

No data available.
SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Small fire: dry chemical extinguishers, carbon-dioxide extinguishers (for ABC or BC fires) and/or foam extinguishers. Large fire: water spray, fire foam, dry chemical powders.

The containers exposed to flames and/or high temperature should be removed from the area of hazard. Alternatively, they should be cooled down with water supplied from a safe distance until the fire is completely put out. Prevent entry of fire water to the storm-water drainage system and/or ground water.

5.2 Special hazards arising from the substance or mixture

Urea may decompose under high temperature conditions, releasing toxic gases, ammonia, carbon dioxide and nitrogen oxides.

5.3 Advice for fire-fighters

Wear gas-tight protective clothing and use self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

- Use protective gloves which are resistant to urea.
- Wear protective clothing.

6.2 Environmental precautions

The following precautions should be taken:

- Prevent the product entry to sewage systems and ground water. Protect sewer inlets, in particular during rainfall (the product is responsible for eutrophication).
- Pump the spilled mixture for recovery.
- When the product is discharged to surface water, notify its potential users. When the product is discharged to the soil or sewage systems, notify relevant local authorities.

6.3 Methods and material for containment and cleaning up

In order to clean up the contaminated area:
Large spillage: Pump the product to a properly labelled waste container to be then used as a fertiliser. In case of excessive contamination, transfer to an authorised waste processing company.

Small spillage: Flush the spill site thoroughly with water and send to a biological sewage treatment plant.

6.4 Reference to other sections

Refer also to sections 8 and 13 in this MSDS.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Handle in well-ventilated places only. Local exhaust ventilation systems should be provided. Keep away all sources of ignition (sparks, flames).

7.2 Conditions for safe storage, including any incompatibilities

The product should be stored in properly closed and labelled containers, in dry and well-ventilated storage rooms. The floor must be solid and efficient ventilation must be provided. The containers should be protected against excessive heat. In order to avoid product solidification, avoid storage temperatures below (–10°C). Keep all combustible materials away.

Recommended packing materials: austenitic-chromium-nickel steel, chromium-nickel-molybdenum steel, or alloy steels with equivalent quality. Polypropylene containers may be used alternatively.

Materials to avoid: unalloyed steel and zinc-coated steel, and copper-containing steel grades; strong oxidisers; nitrites – no common storage or simultaneous transport in one car is allowed.

The product may not be stored jointly with nitrate fertilisers, either.

7.3 Specific end use(s)

No data available.
SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.1 OEL(s) for Poland

PEL for urea – not established
STEL for urea – not established

8.1.2 Derived No Effect Levels (DNELs) – Workers

8.1.2.1 Acute / short term exposure (systemic effects)
DNEL, urea (dermal) 580 mg/kg bw/day
DNEL, urea (inhalation) 292 mg/m³

8.1.2.2 Acute / short-term exposure (local effects)
DNEL, urea (dermal) No data available.
DNEL, urea (inhalation) No data available.

8.1.2.3 Long-term exposure (systemic effects)
DNEL, urea (dermal) 580 mg/kg bw/day
DNEL, urea (inhalation) 292 mg/m³

8.1.2.4 Long-term exposure (local effects)
DNEL, urea (dermal) No data available.
DNEL, urea (inhalation) No data available.

8.1.3 Derived No Effect Levels (DNELs) – general population

8.1.3.1 Acute / short-term exposure (systemic effects)
DNEL, urea (dermal) 580 mg/kg bw/day
DNEL, urea (inhalation) 125 mg/m³
DNEL, urea (oral) 42 mg/kg bw/day

8.1.3.2 Acute / short-term exposure (local effects)
DNEL, urea (dermal) No data available.
DNEL, urea (inhalation)  No data available.

8.1.3.3 Long-term exposure (systemic effects)

DNEL, urea (dermal)  580 mg/kg bw/day
DNEL, urea (inhalation)  125 mg/m³
DNEL, urea (oral)  42 mg/kg bw/day

8.1.3.4 Long-term exposure (local effects)

DNEL, urea (dermal)  No data available.
DNEL, urea (inhalation)  No data available.

8.1.4 Predicted No Effect Concentration (PNEC)

PNEC urea (freshwater/marine water):  0.047 mg/l
PNEC urea (sediment):  No data available.
PNEC urea (soil):  No data available.

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Avoid exposure of workers to urea solutions as far as possible – use suitable ventilation systems.
Eyewash stations should be located close to the work sites and they should be easily accessible. Workers should be given training on how to use safety measures.

8.2.2 Individual protection measures

<table>
<thead>
<tr>
<th>Protection Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye and face protection</td>
<td>Face-fitting safety goggles.</td>
</tr>
<tr>
<td>Respiratory protection</td>
<td>No respiratory protection is required under normal operating conditions.</td>
</tr>
<tr>
<td>Hand protection</td>
<td>Use protective gloves.</td>
</tr>
<tr>
<td>Skin and body protection</td>
<td>Wear protective clothing.</td>
</tr>
</tbody>
</table>
HYGIENE MEASURES
Wash hands after the work is finished.
Do not eat, do not drink and do not smoke when handling NOxy™ (otherwise AdBlue®)

8.2.3 Environmental exposure controls
Do not allow any entry of the product to the sewage system. Store in well-ventilated rooms.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>colourless to straw-yellow</td>
</tr>
<tr>
<td>Odour</td>
<td>faint odour of ammonia</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>no data available</td>
</tr>
<tr>
<td>pH</td>
<td>no data available</td>
</tr>
<tr>
<td>Melting/freezing point</td>
<td>–11.5°C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>no data available</td>
</tr>
<tr>
<td>Boiling range</td>
<td>no data available</td>
</tr>
<tr>
<td>Flash point</td>
<td>no data available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>no data available</td>
</tr>
<tr>
<td>Flammability</td>
<td>no data available</td>
</tr>
<tr>
<td>Upper/lower explosive limit</td>
<td>no data available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>in accordance with CSR for urea: 0.002 Pa at 298 K 1.2 × 10⁻⁵ mm Hg at 25°C (Jones, 1960)</td>
</tr>
<tr>
<td>Vapour density</td>
<td>no data available</td>
</tr>
<tr>
<td>Relative density, at 20°C</td>
<td>1.087 – 1.093 g/cm³</td>
</tr>
<tr>
<td>Solubility</td>
<td>urea will dissolve readily in water, alcohols and liquid ammonia; it is poorly soluble in ether, ethyl acetate, benzene and pyridine; urea is not soluble in chloroform and in many other organic solvents; in accordance with CSR for urea: 624 g/l at 20°C</td>
</tr>
<tr>
<td>n-Octanol/water partition coefficient</td>
<td>in accordance with CSR for urea: log Kow (Pow) = -1.73 at 20°C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>no data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>no data available</td>
</tr>
</tbody>
</table>
Explosive properties: this substance is a non-flammable material which has no structural chemical groups elements indicating explosive or auto-ignition properties

Oxidising properties: no

9.2 Other information

Molecular weight: 60.056

Refractive index for NOxy™ (otherwise AdBlue®): 1.3814 – 1.3843 (20°C, 1013 hPa)

Surface tension (urea): 0.036 N/m (T = 133.3°C)

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

Urea reacts with numerous chemical compounds, both organic and inorganic. It behaves like a weak base in the solutions of strong acids, and it behaves like a weak acid in the solutions of strong bases.

10.2 Chemical stability

The product is stable under recommended storage conditions. Because of its hygroscopicity, humid atmosphere should be eliminated in storage rooms.

10.3 Possibility of hazardous reactions

Toxic fumes will be released in a fire (ammonia, carbon dioxide, nitrogen oxides).

10.4 Conditions to avoid

Avoid storage at excessively high temperatures (over 133°C – initial decomposition point). Avoid humid atmospheres since the product is hygroscopic. Moreover, do not mix with nitrate fertilisers since deliquescence of the mixture will be experienced.

10.5 Incompatible materials

Do not mix with other chemicals (strong acids and bases, strong oxidisers, nitrates, sodium hypochlorite and calcium hypochlorite). In particular, do not mix with pure ammonium nitrate – the resultant urea nitrate may undergo explosive decomposition and gases will be released in the process. Similarly, urea may produce explosive nitrogen trichloride when mixed with hypochlorites.
10.6 Hazardous decomposition products
Thermal decomposition produces ammonia and carbon dioxide.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Toxicokinetics
Large amounts of urea are produced in a human body as a product of normal metabolism. Urea is then excreted in the unchanged form via urine. Hence, no study on toxicokinetics for urea is required.

Absorption
Urea is present in various layers of human skin where it may absorb water to control moisture in the horny epidermal layer. At very high exposure levels, however, urea may be a contaminant and it may enhance dermal absorption of other chemical compounds. According to Bronaugh et al. (1982), the dermal absorption value equals to 7.2 % (based on in vivo tests in rats, which is comparable to in vitro findings). Adsorption rate in accordance with CSA is 9.5 %.

Metabolism
Urea is produced in the body of mammals as a consequence of normal physiological processes, primarily by the detoxification of ammonia resulting from protein catabolism, via the urea cycle.

Excretion
Urea produced by the urea cycle is removed from the blood by glomelural filtration, but it is largely reabsorbed by the renal tubules. Some urea is transported by specific transport systems back into the urine. The clearance of urea is estimated to be 75 ml / minute, equivalent to approximately 1.5 % of the total blood volume per minute.

11.1.1 Relevant hazard classes

Acute toxicity
LD50 urea (rabbit): 14300 mg/kg bw (male)
LD50 urea (mouse): 11500 mg/kg bw (male)
LDLo urea (cattle): 600 mg/kg bw (male/female)
LDLo urea (pigs): > 16000 mg/kg bw (male)
**Skin corrosion/irritation**

In accordance with column 2 in Annex VIII to the REACH Regulation, acute toxicity of urea is very low (based on oral, subcutaneous and intravenous administration to rodents).

**Respiratory sensitisation**

In accordance with column 2 in Annex VIII to the REACH Regulation, urea is a solid and it is not volatile. In the mixture with water (i.e. in the liquid form), it produces no potential risk for the respiratory system.

**Skin/eye irritation**

Urea is a component of treatment creams which are used in case of skin diseases, hence it is not likely to produce dermal irritation in humans. Moreover, urea is present in the epidermis at high levels where it plays a role in skin hydration.

**Irritation of respiratory tract**

There is no information available on incidences of asthma as the occupational disease.

**Mutagenicity**

Large amounts of urea are produced in a human body as a product of normal metabolism. It is present in the blood circulation system at pretty high concentrations. Hence, it is not likely to have any genotoxic potential.

**Carcinogenicity**

There are no indications for carcinogenic properties of urea. The physiological role of urea and the level of its production in a human body are indicative for urea having no carcinogenic potential.

**Toxicity for reproduction**

No studies are available. Considerable amounts of urea are naturally present in a human body, as the product of normal protein catabolism, and it is not very likely that urea is harmful for reproduction.

**SECTION 12. ECOLOGICAL INFORMATION**

**12.1 Toxicity**

**Tests in fish**

PNEC values
Acute toxicity: Urea produces very low acute toxicity to fish: LC50 covers the range from > 6810 to 28000 mg/l.

Long-term toxicity: Urea produces low toxicity to that species: it is a normal product of the protein catabolism and fish developed efficient mechanisms of its excretion.

**Tests in aquatic invertebrates**

Short-term toxicity: In accordance with CSA: the value of EC50/LC50 equals to 10000 mg/l.

Long-term toxicity: Urea produces low toxicity to aquatic invertebrates.

**Tests in algae**

In accordance with CSA: the value of EC10/LC10 or NOEC for freshwater algae equals to 47 mg/l

**Tests in sediment organisms**

Urea is converted quickly in soil by sediment bacteria and it is assimilated to the nitrogen cycle in the nature. High water solubility of urea and its low adsorption are indicative for very low toxicity of that substance to sediment organisms.

**Tests in terrestrial organisms**

**Tests in soil organisms, other than arthropods**

Application of urea (together with other nitrogen-containing fertilisers) reduces the number of earthworms and the amount of biomass, and it lowers the pH parameter of soil. Long-term application of nitrogen fertilisers may be harmful to earthworms when no liming is provided.

**Tests in terrestrial arthropods**

Urea produces low toxicity to terrestrial arthropods.

**Tests in terrestrial plants**

Urea produces low toxicity to terrestrial plants. This substance is in common use as a fertiliser and it is beneficial to the plant growth.
12.2 Persistence and degradability

*Stability in organic solvents*

In accordance with column 2 in Annex IX to the REACH Regulation, stability of the substance in organic solvents is not its essential physical property.

*Hydrolysis*

Urea is stable in aqueous solutions under normal conditions. No hydrolysis takes place because of its molecular structure. The urea molecule undergoes decomposition in the hydrolysis process at elevated temperatures.

*Photo-transformation/photolysis*

*Phototransformation in air, in water and in soil*

No data available.

*Biodegradation*

*Biodegradation in water*

In accordance with CSA, urea is easily biodegradable.

*Biodegradation in soil*

Enzymatic digestion of urea makes the most widespread method of its decomposition. Urea is expected to undergo biodegradation to ammonia and bicarbonate reasonably quickly in soil and in water when the temperature is not too low.

12.3 Bioaccumulative potential

In accordance with CSR: log Kow (Pow) equals to –1.73 at 20°C.

12.4 Mobility in soil

*Adsorption/desorption*

The adsorption factor for urea in soil: Koc = 0.037-0.064.

12.5 Results of PBT and vPvB assessment

In accordance with Directive 67/548/EEC, urea (i.e. principal component of NOxy™ (otherwise AdBlue®)) does not meet the criteria for classification as PTB and vPvB (it
is easily biodegradable and undergoes no bioaccumulation), and it is not a hazardous substance.

12.6 Other adverse effects

No data available.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal must be in compliance with the national and local waste management regulations. The appropriate disposal method depends on the product composition at the time of disposal as well as the local statutes. The product wastes are classified as hazardous – in accordance with the Regulation of the Minister of Environment of 27 September 2001, on wastes catalogue.

Classification of wastes:

07 01 99 Wastes not otherwise specified.
15 01 02 Plastic packaging.
16 03 03 Off-specification batches and unused products.
16 03 04 Inorganic wastes other than those mentioned in 16 03 03 and 16 03 80, or
16 81 01 Wastes resulting from accidents and unplanned events.
16 81 02 Wastes other than those mentioned in 16 81 01.

13.2 Recommended product disposal methods

Waste urea solution should be recycled and re-used as far as possible (e.g. for soil fertilisation). If that outlet is not possible, the collected waste should be transferred for recovery or rendering it harmless to authorised waste processors. Diluted urea solutions may also be discharged to a biological sewage treatment plant which is capable of processing nitrogen compounds.

13.3 Recommended disposal methods for empty packaging

Spent containers should be emptied carefully and cleaned, and then transferred to specialist companies which are involved in recovery and recycling of spent packaging materials. The information on the nearest local waste processing companies is available from the local environmental protection government agencies. It is recommended to pass the wastes to the nearest waste collecting company.
13.4 Special precautions

Do not discharge product into the aquatic environment without pre-treatment (biological treatment plant). Observe the applicable regulations.

13.5 Regulations applicable to wastes

Legal regulations on waste


b) Act of 14 December 2012 on waste (Journal of Laws of 2013, item 21) along with implementing acts;

c) Act of 11 May 2001 on the obligations of some entrepreneurs with respect to the management of some waste and on the product fee and deposit fee (Journal of Laws of 2001 No. 63, item 639; consolidated text, Journal of Laws of 2007, No. 90, item 607, as amended) along with implementing acts;


SECTION 14. TRANSPORT INFORMATION

14.1 UN number

This substance is not covered by any regulations on transport of dangerous goods.

14.2 UN proper shipping name

This substance is not covered by any regulations on transport of dangerous goods.

14.3 Transport hazard class(es)

This substance is not covered by any regulations on transport of dangerous goods.

14.4 Packing group

This substance is not covered by any regulations on transport of dangerous goods.

14.5 Environmental hazards

This substance is not covered by any regulations on transport of dangerous goods. It is not environmentally dangerous.
14.6 Special precautions for user

The mixture is not dangerous in transport. Avoid product spillages.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

No data available.

SECTION 15. REGULATORY INFORMATION

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

EU legislation


National legal regulations

a) Act of 25 February 2011 on chemicals and chemical mixtures (Journal of Laws 2011 No. 63, item 322, as amended) along with implementing acts;


d) Act of 14 December 2012 on waste (Journal of Laws of 2013, item 21) along
15.2 Chemical safety assessment

Chemical safety assessment has been carried out.
SECTION 16. OTHER INFORMATION

16.1. Changes

According to REACH and CLP Regulations.

16.2 A key or legend to abbreviations and acronyms used

CSR Chemical Safety Report.
DNEL Derived No Effect Level.
PNEC Predicted No Effect Concentration.
NOEC No Observable Effect Concentration.
LCx Lethal Concentration x %.
LDx Lethal Dose x %.
PBT Persistent, Bioaccumulative and Toxic.
vPvB Very Persistent and Very Bioaccumulative.
EU EU list comprises three earlier European lists of chemicals which have been put together pursuant to EU legal provisions: EINECS, ELINCS and “No-longer polymers” (NLP) list.
CAS Chemical Abstracts Service.
IUPAC International Union of Pure and Applied Chemistry.
CLP Classification, labelling and packaging of chemical substances and mixtures.
MAC Maximum Admissible Concentration.
MAC (STEL) Maximum Admissible Short-Term Concentration.
ECx Effective concentration which inhibits the x% growth of the population under investigation.
REACH Registration, Evaluation, Authorisation and restriction of Chemicals.
CSA Chemical Safety Assessment.

16.3 Key literature references and sources for data

Urea – registration dossier.

16.4 Advice on training

- An employer is obliged to inform all the workers who come into contact with NOXy® about risks and personal protection equipment listed in the MSDS.
The distributor/downstream user is obliged to give the recipient the information contained in the MSDS.

16.5 In place of
KW-07/ZAK/PZ-025.03_4.

This Material Safety Data Sheet is NOT any product quality specification, and it may NOT be understood as any guarantee for the product quality or for the product compliance with the client’s requirements for individual applications. The purpose of this MSDS is to provide the guidelines for safe handling of the product (occupational safety and environmental protection), its transport and storage. The figures and data specified herein are based on our current knowledge and on current legislation. The clients should verify that information against the provisions of the laws and/or regulations which are valid in their countries and/or companies.