



PRODUCT: GREENOX® (ADBLUE®) (ADBL) REVISION: 5 DATED: 20/05/15 PAGE 1 OF 6

PRODUCT SPECIFICATION

| | |
|-------------------------|--|
| Product Name | Greenox® (AdBlue®) |
| Alternative Name | Automotive urea solution 32, AUS 32, diesel exhaust fluid, DEF |
| Specification Reference | ADBL/5 (05/15/0082001) |

SALES SPECIFICATION

| Characteristics | Unit | Min | Max | Typical Value |
|-------------------------------|-------------------|--------|--------|---------------|
| Urea Content | Weight % | 31.8 | 33.2 | 32.5 |
| Density | g/cm ³ | 1.087 | 1.093 | 1.0895 |
| Refractive Index at 20°C | | 1.3814 | 1.3843 | 1.3829 |
| Alkalinity as NH ³ | % | - | 0.2 | |
| Biuret | % | - | 0.3 | |
| Aldehydes | mg/kg | - | 5 | |
| Insolubles | mg/kg | - | 20 | |
| Phosphate (PO ₄) | mg/kg | - | 0.5 | |
| Calcium | mg/kg | - | 0.5 | |
| Iron | mg/kg | - | 0.5 | |
| Copper | mg/kg | - | 0.2 | |
| Zinc | mg/kg | - | 0.2 | |
| Chromium | mg/kg | - | 0.2 | |
| Nickel | mg/kg | - | 0.2 | |
| Aluminium | mg/kg | - | 0.5 | |
| Magnesium | mg/kg | - | 0.5 | |
| Sodium | mg/kg | - | 0.5 | |
| Potassium | mg/kg | - | 0.5 | |

Greenox® conforms to DIN 70070 and ISO 22241 and is supplied ready to use.

Storage

To maintain the product quality it is recommended that AdBlue® is stored below 25°C and out of direct sunlight. Do not store or allow product to come into contact with mild steel, aluminium, brass, copper or alloys. These will damage the catalyst system.

Shelf Life (in accordance with ISO 22241-3)

Constant ambient storage temperature (°C) Minimum shelf life (months)

| | |
|-----|---|
| ≤10 | 36 |
| ≤25 | 18 |
| ≤30 | 12 |
| ≤35 | 6 |
| ≥35 | Significant decomposition test before use |

Freezing

Adblue® will begin to freeze at -11°C; this does not affect the product quality or strength. The liquid phase of a partially frozen solution will still be at the required concentration and may continue to be used. The remaining frozen portion may be used after allowing to thaw

NOTES

Exclusion of Liability

Information contained in this publication is accurate to the best of the knowledge and belief of Tennants.

Any information or advice obtained from Tennants otherwise than by means of this publication and whether relating to Tennants materials or other materials, is also given in good faith. However, it remains at all times the responsibility of the customer to ensure that Tennants materials are suitable for the particular purpose intended.

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Health and Safety

A Material Safety Data Sheet has been issued describing the health, safety and environmental properties of this product, identifying the potential hazards and giving advice on the handling precautions and emergency procedures. This must be consulted fully before handling, storage and use.



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SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY

1.1 Product Identifier

| | |
|---------------------------|---|
| Trade Name | Greenox®, AdBlue®, Automotive Urea Solution, AUS, Diesel Exhaust Fluid, DEF |
| CAS Number | 57-13-6 |
| EINECS Number | 200-315-3 |
| REACH Registration Number | 01-2119463277-33-xxxx (Urea) |
| Composition | Mixture of urea and water |

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

Identified use(s): NO_x reducing agent, for injection into exhaust system of diesel engines. Industrial use for flue gas NO_x reduction.

Uses advised against: None

1.3 Details of the supplier of the safety data sheet

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Email: msds@tennantsdistribution.com

1.4 Emergency telephone number

Tel: 44(0)844 335 0001 (24 hours)

2. HAZARDS IDENTIFICATION

2.1 Classification of substance or mixture

According to Regulation (EC) No. 1272/2008 (CLP).

This product is not classified according to the CLP regulation.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

Not classified

Information concerning particular hazards for human health and environment:

See section 16 for full text of any R phrases or H statements above see section 11 for more details on any health effects or symptoms.

2.2 Label elements

Labelling according to Regulation (EC) 1272/2008: None

Hazard pictograms: None

Signal word: None

Hazard statements: None

2.3 Other hazards

Results of PBT and vPvB assessment

PBT: Not applicable

vPvB: Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical characterisation: Mixture

CAS No.: 57-13-6

Description: Urea

Identification Numbers:

EC Number: 200-315-5

Chemical characterisation: Mixtures

Description: An aqueous solution of urea

Dangerous components: There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section. Occupational exposure limits, if available, are listed in Section 8.



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| 4. FIRST AID MEASURES |
| 4.1 Description of first aid measures General advice: No special measures required. |
| Inhalation Avoid inhalation of vapour mist or spray. If inhaled, supply fresh air. Get medical attention in case of complaints. |
| Skin contact Immediately rinse with water. If skin irritation continues, get medical attention. |
| Eye contact Check for and remove any contact lenses. Rinse opened eye for several minutes under running water. Get medical attention if irritation occurs. |
| Ingestion Rinse out mouth and then drink plenty of water. Do not induce vomiting: call for medical help immediately. |
| Protection of first-aiders No action shall be taken involving any personal risk or without suitable training. |
| 4.2 Most important symptoms and effects, both acute and delayed Potential acute health effects: Eye contact: No known significant effects or critical hazards. Inhalation: Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure. Skin contact: No known significant effects or critical hazards. Ingestion: No known significant effects or critical hazards. |
| 4.3 Indication of any immediate medical attention and special treatment needed Notes to physician: Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. |
| 5. FIRE FIGHTING MEASURES |
| 5.1 Extinguishing Media Suitable extinguishing media: Use fire extinguishing methods suitable to surrounding conditions. Unsuitable extinguishing media: Not known |
| 5.2 Special hazards arising from the substance or mixture Hazards from the substance or mixture: In a fire or if heated, a pressure increase will occur and the container may burst. Hazardous thermal decomposition products: Decomposition products may include the following materials carbon dioxide, carbon monoxide, nitrogen oxides and ammonia. Avoid breathing dusts, vapours or fumes from burning materials. In case of inhalation of decomposition products in a fire, symptoms may be delayed. |
| 5.3 Advice for fire-fighters Special precautions for fire fighters: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Special protective equipment for fire fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents. |
| 6. ACCIDENTAL RELEASE MEASURES |
| 6.1 Personal precautions, protective equipment and emergency procedures For non-emergency personnel: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment. For emergency responders: If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel". |
| 6.2 Environmental precautions Do not allow to enter sewers/surface or ground water. |
| 6.3 Methods and material for containment and cleaning up Absorb with liquid binding material (sand, diatomite, acid binders, universal binders, sawdust). Send for recovery or disposal in suitable receptacles. |
| 6.4 Reference to other sections No dangerous substances are released. See section 7 for information on safe handling. See section 8 for information on personal protection equipment. See section 13 for disposal information. |



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| 7. HANDLING AND STORAGE | |
| 7.1 Precautions for safe handling Prevent formation of aerosols. Ensure good ventilation in the workplace. Technical measures/ Precautions: Store in a closed, dry room with good ventilation at temperature not below -11 °C and not above +30 °C. Instructions on the limit quantity of the substance/preparation to be stored under the conditions specified: no. Information about fire and explosion protection: No special measures required | |
| 7.2 Conditions for safe storage, including any incompatibilities Storage: Keep containers closed until required. Store away from oxidising agents. See section 10. Protect from frost, store in cool, dry conditions in well-sealed receptacles. | |
| 7.3 Specific end use(s) Store out of direct sunlight and below 30°C to keep product in best condition. For use in catalytic SCR systems the product must not be stored in, or come into contact at any point with: mild steel, aluminium, brass or copper as these will poison the catalyst. | |
| 8. EXPOSURE CONTROLS/PERSONAL PROTECTION | |
| Additional information about design of technical facilities: No further data, see section 7. | |
| 8.1 Control Parameters Ingredients with limit values that require monitoring at the workplace: The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace. | |
| 8.2 Exposure controls Personal protective equipment: Select PPE appropriate for the operations taking place into account the product properties. General protective and hygiene measures Avoid close or long term contact with the skin. Do not eat, drink, smoke or sniff while working. Avoid contact with the skin. Do not inhale gases, fumes or aerosols. Wash hands before breaks and at the end of work. | |
| Eye/face protection Safety glasses. | |
| Hand protection Wear gloves impermeable to the product. | |
| Respiratory protection In case of inadequate ventilation wear respiratory protection. Recommended: Filter P2 (EN143) | |
| Body protection Protective work clothing. | |
| 9. PHYSICAL AND CHEMICAL PROPERTIES | |
| 9.1 Information on basic physical and chemical properties | |
| Appearance | Fluid |
| Colour | Clear |
| Odour | Ammonia like or odourless |
| pH-value at 20°C | 8-10 |
| Melting point (°C) | -11°C |
| Boiling point (°C) | 100°C |
| Decomposition temperature | Not determined |
| Self-igniting | Product is not self-igniting |
| Danger of explosion | Product does not present an explosion hazard |
| Flash point | Not applicable |
| Flammability | Not flammable |
| Explosion limits | Not determined |
| Vapour pressure at 20°C | 23 hPa |
| Density at 20°C | 1.087 to 1.093 g/cm ³ |
| Solubility in/miscibility with water | Fully miscible |
| Partition coefficient (n-octanol/water) | Not determined. Inorganic substance. |
| Viscosity | 1.4 mPa.s @20°C |



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| 10. STABILITY AND REACTIVITY |
| 10.1 Reactivity Stable under regular conditions. |
| 10.2 Chemical stability Stable under regular conditions. Thermal decomposition/conditions to be avoided The residue upon evaporation decomposes on heating above 220°C producing toxic gases. |
| 10.3 Possibility of hazardous reactions Reacts violently with strong oxidants, nitrates, inorganic chlorides, chlorites and perchlorates causing fire and explosion hazard. |
| 10.4 Conditions to avoid For intended use, avoid contamination with metal, dust or organic matter. |
| 10.5 Incompatible materials Strong oxidising agents, nitrate, chlorites and perchlorates. For intended use, the product must not be in contact with mild steel, aluminium, brass, copper or alloys as these can damage the catalyst system. |
| 10.6 Hazardous decomposition products Under normal conditions none. |
| 11. TOXICOLOGICAL INFORMATION |
| 11.1 Information on toxicological effects |
| Acute toxicity |
| Acute oral toxicity: LD50: 8471 mg/kg bw (for urea). |
| Acute dermal toxicity: LD50: 8200 mg/kg bw (for urea). |
| Acute inhalation toxicity: not relevant. |
| Skin irritation or/and sensitization: Not irritating. Not sensitizing effect known. |
| Mutagenicity: Ames-test: negative |
| Carcinogenicity: Ames-test: negative |
| Reproductive toxicity: Ames-test: negative |
| Specific toxicity for particular organ (STOT) (one time effect): None. |
| Specific toxicity for particular organ (STOT) (repeated effect): None. |
| 12. ECOLOGICAL INFORMATION |
| 12.1 Toxicity Aquatic toxicity 57-13-6 Urea EC50 >10000 mg/kg (daphnia) |
| 12.2 Persistence and degradability Biodegradable |
| 12.3 Bioaccumulative potential Product is not expected to bioaccumulate |
| 12.4 Mobility in soil No further relevant information available |
| 12.5 Results of PBT and vPvB PBT: Not applicable vPvB: Not applicable |
| 12.6 Other adverse effects No further relevant information available. |
| 13. DISPOSAL CONSIDERATIONS |
| 13.1 Waste treatment methods Recommendation Recommended Hierarchy of Controls: Minimise waste Reuse if not contaminated Recycle, e.g. dilution and use as fertilizer Safe disposal (if all else fails). European waste catalogue Waste code 06 10 99 (wastes not otherwise specified) |
| 13.2 Uncleaned packaging Recommendation: Disposal must be made according to official regulations Recommended cleansing agents: Water if necessary together with cleansing agents |



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14. TRANSPORT INFORMATION

This product is not classed as hazardous for transport (ADR, RID, IMDG).

15. REGULATORY INFORMATION

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

EU Regulation (EC) No. 1907/2006 (REACH) Annex XIV - List of substances subject to authorization Substances of very high concern: Not applicable.

Other EU regulations

Europe inventory: All components are listed or exempted.

Seveso II Directive

This product is not controlled under the Seveso II Directive. National regulations

Notes: To our knowledge no other country or state specific regulations are applicable.

15.2 Chemical safety assessment: A chemical safety assessment has not been carried out.

16. OTHER INFORMATION

Abbreviations

EC50: median effective concentration

LC50: median lethal concentration

LD50: median lethal dose

NOEC: no observable effect concentration

OEL: occupational exposure limit

PBT: persistent, bioaccumulative, toxic chemical

PNEC: predicted no-effect concentration

STEL: short-term exposure limit

TWA: time weighted average

vPvB: very persistent, very bioaccumulative chemical

Source of key data used to compile the data sheet

Supplier information

Modifications from last revision

The Specification has been updated. The Safety Data Sheets have been revised in accordance with current requirements

Date: 20/05/15

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