BALCHEM™
ANIMAL NUTRITION & HEALTH

NitroShure™ MSDS - English
Revised: 15 June 2010
Supersedes: 6 October 2009

MATERIAL SAFETY DATA SHEET
According to OSHA Regulation 29 CFR 1910.1200 and Regulation (EC) No. 1907/2006

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **NitroShure™**

SYNONYMS: Urea, encapsulated
Diaminomethanal

TYPICAL USES: Nutritional Additive for Feed

MANUFACTURER:
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24h EMERGENCY PHONE: Not required. If needed, the company can be reached via CHEMTREC at + 1-703-527-3887 [USA]

2. HAZARDS IDENTIFICATION

Emergency Overview

Tan to brown, free-flowing granules with slight ammonia and burnt sugar odor. Not classified as hazardous according to US Hazard Communication Regulation (29 CFR 1910.1200), the EEC Dangerous Substance Directive and Dangerous Preparation Directive (67/548/EEC and 1999/45/EC). No risk to the environment expected. Warning! Product may form combustible dust concentrations in air (during processing).

Potential Health Effects

Eye: No hazard expected. Dust may cause eye irritation.

Inhalation: No adverse effects anticipated by breathing small amounts during proper industrial handling. All dusts have potential to irritate respiratory tract. Breathing large amounts of dust may cause injury. Chronic exposure to dust may result in delayed lung injury.

Skin: No hazard expected. Dust may cause skin irritation. While repeated or prolonged contact with urea may cause reddening, itching and inflammation, encapsulation is expected to prevent chemical irritation.

Ingestion: No hazard expected. Large quantities may cause gastrointestinal disturbances including irritation, nausea, vomiting and diarrhea.

Systemic: No known physiological hazards.

Medical Conditions Aggravated by Exposure: None determined

3. COMPOSITION/INFORMATION ON INGREDIENTS

Also see Section 15.

Components	Weight %	CAS #	Feed Registry #	REACH Reg #	IUPAC Name
Urea*	------	57-13-6	2.1.1	Not applicable	Diaminomethanal
Food grade Lipids	------	Various	Not applicable	Not applicable	Water
Caramel Color	------	8028-89-5	Not applicable	Not applicable	Not available

* Reagent and chemical grade urea does not contain formaldehyde.

Exposure Limits

OSHA Nuisance Dust PELs (29 CFR 1910.1000): Respirable fraction = 5 mg/m^3; Total = 15 mg/m^3

Risk Phrases and Symbols

None

4. FIRST AID MEASURES

Symptoms: Acute – None determined
Chronic – None determined

Eye: As a precaution, flush with clean, low-pressure water for at least fifteen minutes while occasionally lifting eyelids. If irritation occurs and persists, get medical attention.

Inhalation: If there is difficulty breathing, remove to fresh air and get medical attention.

Skin: As a precaution, wash with water, use soap if available. If extensive skin contact occurs, remove contaminated clothing and wash contacted skin with soap and water. In the unlikely event that irritation does occur/persist after contact, check with medical personnel. Wash contaminated clothing before reuse.

Ingestion: As a precaution, seek medical attention. A single dose of 100 grams urea has reportedly caused mild symptoms of central nervous system depression (drowsiness, etc.). High blood concentrations of urea may increase the risk of glaucoma.

Note to Physician: Medical attention should not be required. There are no adverse effects expected from exposure to this product. If medical attention is sought, treatment should be based on the judgement of the physician in response to the reactions of the patient.

5. FIRE FIGHTING MEASURES

Flammable Properties: Flash point – Urea: burns with difficulty; Lipids > 100 °C (212 °F).

Flammable Limits: Lower Flammable Limit (LFL) – not applicable
Upper Flammable Limit (UFL) – not applicable

Auto Ignition Temperature: Not available. Vegetable oil fire may typically occur at temperatures exceeding 357 °C (675 °F).

Hazardous Combustion Products: No specific hazards. Combustion will produce compounds of carbon, hydrogen, nitrogen, and oxygen including biuret, ammonia, carbon monoxide and carbon dioxide. The exact composition of the products of combustion will depend on the conditions of combustion. Heating above 270 °F (132 °C) causes urea decomposition to cyanuric acid, cyanic acid, biuret, ammonia, and nitrogen oxide.

Other Fire and Explosion Hazards: Treat as burning fat and do not use water jet. Possible dust explosion. Dust explosion hazard results for vegetable oils indicate a P_{max} of 7.6 bar(g), K_{St} value of 167 bar m/sec, and a minimum ignition energy of approximately 2.1 mJ classifying it as ST 1 class dust for particles less than 75 micron diameter (mean 32 micron) and 0.3 wt% moisture. Explosion hazard results for urea indicate it is a ST 1 class dust. Rags and other materials containing lipids could potentially heat and spontaneously ignite if exposed to air.

Extinguishing Media: Water, Foam, CO_2, Dry Chemical

Fire Fighting Equipment: Full protective equipment (Bunker Gear) and NIOSH/MSHA approved SCBA should be used for all indoor and any significant outdoor fires. For small outdoor fires which may easily be extinguished with a portable fire extinguisher, use of a SCBA may not be required.

Fire Fighting Instructions: Water run off can cause environmental damage. Dike and collect water used to fight fires. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source, is a potential dust explosion hazard. This material may present an explosion and deflagration hazard risk when dispersed and ignited in air. Secondary explosions may also pose a risk once an initial explosion occurs with the presence of a combustible dust or powder in the area.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: See Section 8.

Environmental Precautions: As good practice, prevent material from entering waterways; collect as much as possible for reuse or disposal.

Cleaning Method: Vacuum or sweep material and place in a disposal container. Dust should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (e.g., avoid clearing dust surfaces with compressed air). Urea forms corrosive solutions when dissolved in water (or tears).

7. HANDLING AND STORAGE

General Handling Precautions
Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid breathing dust. Ensure containers are properly secured before moving. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precaution, such as electrical grounding and bonding, or inert atmospheres. Avoid containers, piping or fittings made of brass, bronze, or other copper bearing alloys or galvanized metals.

Storage Information
Storage temperature: 10 °C to 32 °C (50 °F to 90 °F) recommended; do not exceed 50 °C (122 °F). Keep dry in sealed bags.

Shelf Life: No known limit. Best if used within two years of manufacturing date.

Special Sensitivity: None

Miscellaneous: None.

Specific Use: No special requirements apply to expected use as a nutritional feed additive.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits: See Section 3.

Engineering Controls: Provide ventilation and particulate control to maintain airborne levels below the exposure guidelines. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work are (i.e., there is no leakage from the equipment). Use only appropriately classified electrical equipment and powered industrial trucks.

Eye Protection: Use safety glasses. If there is a potential for exposure to particles which would cause mechanical injury to the eye, wear chemical goggles.

Respiratory Protection: For most conditions, no respiratory protection should be needed; however, in dusty atmospheres, use an approved dust respirator. In confined or poorly ventilated areas or emergency and other conditions where the exposure guidelines may be greatly exceeded, use an approved positive pressure self-contained breathing apparatus.

Hand and Skin Protection: As a general precaution, use gloves. No additional precautions other than clean body-covering clothing should be needed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Also see Section 5

Appearance:	Tan to brown, free-flowing granules
Physical state:	Solid
Chemical Family:	Amide
Odor:	Slight ammonia and burnt sugar odor
Molecular Formula:	CH_4N_2O (urea)
Molecular Weight:	60.06 (urea)
Specific Gravity:	Urea: 1.32; Lipids: 0.9
Bulk Density:	Not available
Solubility:	Partially soluble (Urea: 780 g/L at 5 °C; 1193 g/L at 25 °C)
Octanol/Water Partition Coefficient	Not available
pH:	Urea: 7.2 at 100 g/L
Melting Point:	Urea: 271 °F (133 °C); Lipids: 57 – 71 °C (135 – 160 °F)
Boiling Point:	Urea decomposes at 135 °C (275 °F); Lipids: > 250 °C (482 °F)
Evaporation Rate:	Not available (assumed to be essentially zero)
VOC Content:	Not available (assumed to be essentially zero)
Vapor Pressure:	80 Pa at 20 °C for urea (calculated)
Vapor Density (air=1):	Not available
Viscosity:	Not available

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal conditions. After a long period of time, may slowly hydrolyze to ammonium carbamate which further decomposes to ammonia and carbon dioxide.

Material Incompatibility: Avoid contact with strong acids (e.g. nitric, perchloric), bases and oxidizers (e.g. permanganate, dichromate, nitrate, chlorine), and nitrates. Explosive mixtures may form if urea is mixed with strong acid (nitric/perchloric). Reacts with sodium or calcium hypochlorite to from explosive nitrogen trichloride. Urea is incompatible with sodium nitrate, gallium perchlorate, phosphorus pentachloride, nitrosyl perchlorate, titanium tetrachloride and chromyl chloride.

Hazardous Decomposition Products: Compounds of carbon, hydrogen, nitrogen, and oxygen.

Hazardous Polymerization: None

11. TOXICOLOGICAL INFORMATION (100% Urea)

LD_{50} – 14,300 to 15,000 mg/kg (oral rat)
LD_{50} – 11,500 to 13,000 mg/kg (oral mouse)
LD_{50} – 510 mg/kg (oral cattle)
Chronic Toxicity: A study of 67 workers in an environment with high airborne concentrations of urea found a high incidence of protein metabolism disturbances, moderate emphysema, and chronic weight loss.
Carcinogenicity Not listed by IARC, NTP or OSHA

12. ECOLOGICAL INFORMATION (100% Urea)

LC_{50} > 9,1000 mg/L 96-h *Barillius barna* (fish)
EC_{50} > 10,000 mg/L 24-h *Daphnia magna* (aquatic invertebrate)
TT > 10,000 mg/L 192-hr cell multiplication inhibition test *Scenadesmus quadricauda* (aquatic plant)
LD_{LO} = 16,000 mg/kg subcutaneous pigeon
Since urea is a fertilizer, it may promote eutrophication in waterways. Non-toxic to aquatic organisms as defined by USEPA. Stability in water: $T_{½}$ > 1 year and ultimately biodegrades.

13. DISPOSAL CONSIDERATIONS

Product: Not considered a hazardous waste under Federal Hazardous Waste Regulations (40 CFR 261). Product solutions should be treated in a wastewater treatment plant after securing treatment plant acceptance. Powder or absorbed solution should be landfilled after securing Environmental Regulatory Agency and landfill operations approval. Consult state and local regulations regarding proper disposal as they may be more restrictive or otherwise different from Federal regulations.

Packaging: Dispose of packaging contaminated by product in accordance with regulations.

14. TRANSPORT INFORMATION

EU: As produced, this product is not subject to hazardous material transport regulations in Europe.
US: Not a D.O.T. Hazardous Material (49 CFR 172.101).

Labeling: Containers of this product need no special warning labels. Only a product identity label is needed.

15. REGULATORY INFORMATION

U.S. Federal Regulations

OSHA: This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

PSM: This product is not subject to Process Safety Management (29 CFR 1910.119).

FIFRA: Not applicable

TSCA: On TSCA inventory

CERCLA: Reportable Quantity – None (40 CFR 302.4)

SARA TITLE III: Section 302 Extremely Hazardous Substances – None (40 CFR 355)
Section 311/312 Hazard Categories – None (40 CFR 370.2)
Section 313 Toxic Chemicals – None (40 CFR 372.65)

RMP: Not listed under the Risk Management Plan (40 CFR 68).

RCRA: If discarded in purchased form, this product is not a listed or characteristic hazardous waste. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24).

CWA: Release into a waterway may require reporting to the National Response Center @ 800-424-8802 (40 CFR 116.4).

FDA/USDA: Follow Good Manufacturing Practice (GMP). Urea AAFCO #66.1. Urea is GRAS per 21 CFR 581.5530; Caramel Color is GRAS per 21 CFR 73.85, 182.1235. Urea IFN #5-05-070. This product does not contain protein derived from mammalian tissues and is certified to be free of the agent that causes transmissible spongiform encenphalopathy (TSE) [21 CFR 589.2000].

International Regulations

Canadian Dangerous Substance List (DSL): Listed (published 5 April 1994)

European Inventory of Existing Commercial Chemical Substances (EINECS): No. 200-315-5

Australian Inventory of Chemical Substances (AICS): Unknown

Korean Existing Chemicals List (ECL): Unknown

Japan ENCS: Unknown

German Water Class (WKG): Unknown

State Regulations

This product is not subject to California Proposition 65.

There are no known additional requirements necessary for compliance with state right-to-know regulations.

16. OTHER INFORMATION

For safe handling, refer to NFPA 654, *Standard for the prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids*.

Reason for Issue: Updated MSDS to conform to information requirements / format of the REACH regulation Annex II.

Risk Phrases Used: None used

Hazard Ratings – The following hazard ratings are recommended for this product:

	NFPA
Fire	- 1
Health	- 0
Reactivity	- 0
Specific Hazard	- None

Abbreviations – The following abbreviations may be used in this document:

% - percent
µg/kg - micrograms per kilogram
g/kg – grams per kilogram
lb/ft^3 – pounds per cubic foot
mg/kg – milligrams per kilogram
mg/m^3 – milligrams per cubic meter
mmHg – millimeters of mercury
ppm – parts per million
w/w – Weight per weight
ACGIH – American Council of Governmental Industrial Hygienists
AICS – Australian Inventory of Chemical Substances
CAS – Chemical Abstract Service
CERCLA – Comprehensive Emergency Response, Compensation and Liability Act
CFR – Code of Federal Regulations
CWA – Clean Water Act
D.O.T. – Department of Transportation
DSL – Domestic Substance List (Canada)
ECL – Existing Chemicals List (Korea)
EINECS – European Inventory of Existing Commercial Substances
FDA – Food and Drug Administration
FIFRA – Federal Insecticide, Fungicide and Rodenticide Act
IDLH – Immediately Dangerous to Life and Health
LD_{50} – Lethal dose for 50% mortality of subject species
LD_{LO} – Lethal dose low; the lowest dose of a substance introduced by any route other than inhalation reported to have caused death in humans or animals.
LFL – Lower Flammable Limit
MSHA – Mine Safety Health Administration
NFPA – National Fire Protection Association
NIOSH – National Institute of Occupational Safety and Health
OSHA – Occupational Safety and Health Administration
PEL – Permissible Exposure Limit (default 8-hour day, 40-hour week TWA)
PSM – Process Safety Management
RCRA – Resource Conservation and Recovery Act
REL – Recommended Exposure Limit (default 10-hour day, 40-hour week TWA)
RMP – Risk Management Plan
SARA – Superfund Amendment and Reauthorization Act

STEL – Short Term Exposure Limit (default 15-minute TWA)
TD_{LO} – Lowest dose to which humans or animals have been exposed and reported to produce a toxic effect other than cancer
TSCA – Toxic Substance Control Act
TWA – Time Weighted Average
UFL – Upper Flammable Limit
USDA – United States Department of Agriculture

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