Urea: Product Identification

Trade Name(s): Urea; Urea – RBU™
Synonyms: Urea-Prilled, Forestry or Commercial grade; 46-0-0; Carbamide; Carbonyldiamide; Aquadrate; Ureaphil; Ureophil

Chemical Family: Amide
Chemical I.D. No.: STCC # 2818170
Chemical Formula: CO(NH₂)₂

Urea: Composition

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS Number</th>
<th>Wt%</th>
<th>OSHA PEL¹</th>
<th>ACGIH STEL²</th>
<th>NIOSH IDLH³</th>
<th>ACGIH TLV⁴</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>57-13-6</td>
<td>98.0%</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>15</td>
<td>mg/m³</td>
</tr>
<tr>
<td>Biuret</td>
<td>108-19-0</td>
<td>&lt; 0.5%</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>ppm</td>
</tr>
<tr>
<td>Methylene Diurea (MDU)</td>
<td>N.A.</td>
<td>1.5%</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>ppm</td>
</tr>
</tbody>
</table>

¹ = Permissible Exposure Limit (8-Hr. Time Weighted Average).
² = Short Term Exposure Limit (15 Minute Exposure).
³ = Immediately Dangerous to Life and Health.
⁴ = 15 mg/m³ Total Nuisance Dust (8-Hr. Time Weighted Average).
Ca** = NIOSH has recommended that this substance be treated as a potential human carcinogen.
N.A. = Not Available

Urea: NFPA Code

1 Health Hazard (Blue):
   Can cause irritation if not treated.

0 Flammability Hazard (Red):
   Will not burn.

0 Reactivity Hazard (Yellow):
   Normally stable. Not reactive with water.

NONE Special Notice (White):
   None
Urea: Physical and Chemical Properties

Melting Point: 271°F (133°C)
Decomposition Temperature: 275°F (135°C)
Nitrogen Content: 46.65% (pure)
Solubility in H₂O: 112.4g / 100g
Specific Gravity: 46 lb/cu.ft. @ 68°F (20°C) (0.74 g/cc)
pH: 8.5-9.5
Odor: Slight Ammonia Odor
Appearance: White Crystal

Urea: Fire and Explosion Data

Flash Point: N.A.
Flammable Limits in Air %/Vol.: Lower: N.A., Upper: N.A.
Autoignition Temperature: N.A.
Extinguishing Media: N.A.

Special Fire Fighting Procedure: Fire-fighters should wear self-contained breathing apparatus and full protective clothing.

Unusual Fire or Explosion Data: Urea solid will not burn or support combustion but will decompose into noxious, poisonous gas when exposed to the high temperatures of a fire.

Urea: Reactivity Data

Stability: Stable at room temperature, decomposes at high temperature. Can be made explosive when dissolved in Nitric Acid, even without completely drying.

Hazardous Polymerization: Will not occur

Conditions to avoid / Incompatibility: Nitric Acid, gallium, perchlorate, strong oxidizing agents, caustics and alkalis.

Hazardous Decomposition Products: Carbon Dioxide, and Ammonia (Ammonia oxidized further to Nitric Oxide and Nitrogen Dioxide).
**Urea: Health Hazard Data**

<table>
<thead>
<tr>
<th>Carcinogenicity:</th>
<th>NTP</th>
<th>IARC Monographs</th>
<th>OSHA Regulated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urea</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Biuret</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Methylene Diurea</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

**Occupational Exposure Limits:**

**OSHA Permissible Exposure Limit (PEL):**
- Urea = None established
- Biuret = None established
- Methylene Diurea = None established

**ACGIH Short-term Exposure Limit (STEL):**
- Urea = None established
- Biuret = None established
- Methylene Diurea = None established

**NIOSH Immediately Dangerous to Life and Health (IDLH):**
- Urea = None established
- Biuret = None established
- Methylene Diurea = None established

**ACGIH Threshold Limit Value (TLV):**
- Urea = 15 mg/m³ Total Nuisance Dust (8 Hr. Time Weighted Average).

**Effects of Overexposure:**

**Acute:**
- **Eyes:** Dust and micro particles may cause eye irritation.
- **Skin:** Frequent or prolonged contact with dust may aggravate preexisting dermatitis and possibly promote an allergic reaction.
- **Inhalation:** Excessive inhalation of the dust may cause sore throat, coughing and irritation of mucous membranes and the respiratory tract.
- **Ingestion:** Abdominal pain, nausea, vomiting and gastrointestinal irritation may result. (Urea is a protein to ruminants, animals with the enzyme Urease in their digestive systems, but is toxic to humans).

**Chronic:**
- None known for Urea.
Urea: Emergency First Aid Procedures

Eye contact: Immediately flush with large amounts of water, including under the eyelids. If pain persists seek medical attention, preferably an Ophthalmologist. Speed and thoroughness in rinsing eyes are important to avoid permanent injury.

Skin Contact: Immediately remove contaminated clothing and shoes. Wash affected area with soap and flush with large amounts of water. Seek medical attention if irritation develops.

Inhalation: Remove to fresh air. If breathing has stopped, apply artificial respiration. Keep warm and at rest. Get medical attention immediately.

Ingestion: Do not induce vomiting. If vomiting occurs, keep head below hips to help prevent aspiration. Get medical attention immediately.

Urea: Special Protection Information

Eye Protection: Urea is water soluble and will dissolve with mucosal membrane contact (eyes). Remove contact lenses and wear safety glasses, chemical goggles or face shield where contact with dust or micro particles may occur.

Skin Protection: Urea is water soluble and will dissolve with perspiration contact. Wearing of appropriate protective clothing and gloves is suggested if epidermal sensitivity develops.

Inhalation: Urea is water soluble and will dissolve with mucosal membrane contact (lungs). Use approved respiratory protective equipment for cleaning large spills or upon entry into large tanks, vessels, and other designated confined space areas or in any situations where airborne concentrations may exceed occupational exposure limits (15 mg/m³).

Ventilation: Provide adequate general and local exhaust ventilation to avoid reaching occupational exposure limits, particularly in a confined space area.

Urea: Spill or Leak

Spill Procedures: Shovel spilled material into containers for disposal. Do not flush to surface water. Spilled chemical can be used as fertilizer (46-0-0).

Urea: Waste Disposal

Procedure: Dispose through a licensed waste disposal company. Follow federal, state and local regulations.

Urea: Special Precautions and Comments

Storage Precautions: Store away from incompatible materials or sources of heat and ignition. Empty containers may contain residue and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flames, sparks or other sources of ignition; they may evolve noxious fumes.
Urea: EPA SARA Title III Information

EPCRA Section 311/312 Hazard Categorization:

<table>
<thead>
<tr>
<th>Acute</th>
<th>Chronic</th>
<th>Fire</th>
<th>Pressure</th>
<th>Reactive</th>
</tr>
</thead>
</table>

EPCRA & CAA Hazardous Substances:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>% / wt.</th>
<th>CAA 112(r)</th>
<th>302 TPQ lb.</th>
<th>304 RQ lb.</th>
<th>313 TRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key:
- CAA 112(r) = Toxic Substance with potential for airborne release
- Sec. 302 TPQ = Extremely Hazardous Substances (EHS) Threshold Planning Quantity
- Sec. 304 RQ = EHS and CERCLA Reportable Quantity if spilled
- Sec. 313 TRI = Toxic Chemicals to be reported on Toxic Release Inventory if spilled
- NA = Not Applicable

DYNO NOBEL INC. Disclaimer
The information contained herein is provided for reference purposes only and is intended only for persons having relevant technical skills. Because conditions and manner of use are outside of our control, the user is responsible for determining the conditions of safe use of the product. While the information is believed to be correct, DYNO NOBEL INC. shall in no event be responsible for any damages whatsoever, directly or indirectly, resulting from the publication or use of or reliance upon the information contained herein. (No warranty, either expressed or implied, of merchantability or fitness for a particular purpose, or of any nature with respect to the product, or to the information, is made herein.)