

POTENTIAL HEALTH EFFECTS

Primary Routes of Entry: Skin contact/absorption, eye contact, and vapor inhalation.

General Acute Exposure: May cause irritation to eyes and skin. Ammonia and carbon dioxide vapors may accumulate in a confined space.

General Chronic Exposure: No test data available.

Carcinogenicity:

NTP: Not Listed

IARC: Not Listed

OSHA: Not Regulated

Medical Conditions Aggravated by Exposure: No test data available.

4. FIRST AID MEASURES

First Aid for Eyes: Flush eyes with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, excessive tearing, or light sensitivity persists, the patient should be seen in a health care facility.

First Aid for Skin: If irritation occurs, flush exposed area with copious amounts of tepid water for at least 15 minutes followed by washing area thoroughly with soap and water. The patient should be seen in a health care facility if irritation or pain persists.

First Aid for Inhalation: If irritation develops move patient to fresh air and monitor. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation. If trained to do so, administer supplemental oxygen if needed. If irritation, coughing, or difficulty in breathing persists the patient should be seen in a health care facility.

First Aid for Ingestion: If conscious, give the patient large quantities of water to drink and induce vomiting. Seek medical attention.

5. FIRE FIGHTING MEASURES

Urea liquor is not flammable.

Extinguishing Media: Use water to extinguish a fire involving urea liquor if water is compatible with the burning material.

Special Fire Fighting Procedures:

- a. Positive pressure self-contained breathing apparatus (SCBA) should be used when there is a potential for inhalation of vapors and/or fumes.
- b. Wear full fire fighting protective equipment that is appropriate for conditions.

Caution:

- a. Runoff from fire control or dilution water may cause pollution.
- b. At elevated temperature, urea liquor may decompose to form cyanuric acid, ammonia, biuret, and/or nitrogen oxides.

6. ACCIDENTAL RELEASE MEASURES

Spill or Leak Measures: Keep unnecessary people away and isolate hazard area. Urea liquor may be toxic to cattle (ruminants) when ingested if amount ingested is not controlled properly.

Determining Spill Size: Generally, a small spill is one that involves a single, small package (i.e. up to a 55 gallon drum), small cylinder, or a small (non-continuing) leak from a large container.

Small or Large Spill:

- a. Spilled urea liquor may cause slippery conditions.
- b. Recover and use as fertilizer.
- c. If disposal of product or contaminated by-products is necessary, follow guidelines set forth by local, state, and federal environmental agencies.
- d. Runoff may cause pollution.

7. HANDLING AND STORAGE

No unusual storage precautions are necessary.

Handling Precautions: Use proper personal protective equipment when working with or around urea liquor. (See section 8).

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Respiratory Protection Requirements: Urea liquor may pose an inhalation hazard in confined areas due to its ability to produce ammonia and carbon dioxide vapors. If necessary to enter an area that contains urea liquor, monitor for ammonia and oxygen content. Oxygen levels should be maintained between 19.5% and 23.5%, if outside of this range use appropriate precautions. If ammonia vapors are present, protect as follows:

<25 ppm:	No protection required.
25 to 35 ppm:	Protection required if the daily TWA is exceeded.
35 to 50 ppm:	Protection required if exposed for more than 15 minutes
50 to 250 ppm:	Minimum of an air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
250 to 300 ppm:	Minimum of a full-face air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
>300 ppm:	A fresh air supply system must be used (i.e. positive pressure self contained breathing apparatus)

Engineering Controls: Adequate ventilation should be supplied.

Skin Protection Requirements: Impervious gloves should be worn. Urea liquor may be shipped at elevated temperatures (depending upon concentration). Additional protection for hands and skin should be used to prevent contact of hot liquid.

Eye Protection Requirements: It is recommended that safety glasses or goggles be used and if there is a potential for splashing liquid, a face shield should be used in conjunction with the safety glasses or goggles.

Other Protective Equipment: Safety shower and eyewash fountain or at least 5 gallons of accessible clean water should be provided in a urea liquid handling area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: Liquid
Color: Colorless
Odor: Slight ammonia odor (pungent)
Boiling Point: 50% urea solution boils at 223° F (106° C)
Melting point: 50% urea solution salts out at 64° F (18° C)
70% urea solution salts out at 135° F (57° C)
PH range: 7.0 to 10.0 (depending upon free ammonia)
Solubility: 100%
Specific Gravity: 1.14 for 50% urea solution
1.175 for 70% urea solution
Vapor Density: No test results
Vapor Pressure: No test results
% Volatile by Volume: No test results
Molecular Weight: Not applicable
Density: 9.51 lb. per gallon for 50 % solution
9.80 lb. per gallon for 70 % solution
Critical Temperature: No test results
Critical Pressure: No test results

10. REACTIVITY

Stability: This is a stable material.

Hazardous Polymerization: Will not occur.

Decomposition: Urea liquor forms ammonia, cyanuric acid, biuret, and/or nitrogen oxides (NO_x) upon decomposition.

Incompatibilities: Incompatible with sodium nitrite, phosphorus pentachloride, and nitrosyl or gallium perchlorate. Urea will form urea nitrate when mixed with nitric acid at low pH. Urea nitrate may become unstable and/or explosive under certain conditions.

11. TOXICOLOGICAL INFORMATION

Toxicity

Acute Oral Toxicity

LD₅₀, Rat: 14,300 – 15,000 mg/kg

LD₅₀, Mouse: 11,500 – 13,000 mg/kg

LD₅₀, Cattle: 510 mg/kg

Repeated Dose Toxicity

Rat: NOAEL = 40% in ointment (24 wks; dermal)

Ecotoxicity

Acute Toxicity to Fish

LC₅₀ *Barillius barna* 9,100 mg/L (96 hr)

Acute Toxicity to Aquatic Invertebrates

EC₅₀ *Daphnia magna* >10,000 mg/L (DIN 38412 Part II; 24 hr)

Toxicity to Aquatic Plants

TT *Scenedesmus quadricauda* >10,000 mg/L (192 hr cell multiplication inhibition test)

Note: Data is for Urea

Source: TFI Product Testing Program April 2003

12. ECOLOGICAL INFORMATION

Notify local health and wildlife officials and operators of any nearby water intakes of contamination or discharge into or leading to waterways.

Note: See Ecotoxicity information in section 11.

13. DISPOSAL CONSIDERATIONS

Urea liquor is not listed by the Federal EPA as a hazardous waste. Consult state/provincial and local environmental agencies for acceptable disposal methods. Recover product for use as a fertilizer if possible.

14. TRANSPORTATION INFORMATION

Urea liquor is not listed by any U.S. or Canadian transportation authority as a hazardous material and as such, no specific information is available.

15. REGULATORY INFORMATION

SARA TITLE III: Not Listed

CERCLA Hazardous Substances List: Not Listed

TSCA Inventory: Listed

16. OTHER INFORMATION

Nov. 5, 1996: The MSDS was rewritten to comply with ANSI Standard Z400.1-1993.

July 1, 2003: Added toxicity information from the TFI Product Testing Program 2003.

August 4, 2006: Reviewed and reissued without revisions.

October 4, 2006: Revised Reactivity section to add information concerning the hazards of urea nitrate formation when urea is mixed with nitric acid.

August 24, 2007: Added pH range.

October 1, 2008: Minor language change to skin protection requirements, removed reactivity references to chlorinated compounds.

July 17, 2009: General review. Removed ammonium carbamate from Section 2 and revised component percentages.

The information and recommendations herein are taken from data contained in independent, industry-recognized references including but not limited to NIOSH, OSHA, CHRIS, the TFI Product Testing Program, and SAX's Dangerous Properties of Industrial Materials - ninth edition. Terra Industries Inc. makes no guarantee, warranty or other representation concerning this substance, since conditions of its use are beyond the control of the company. Terra Industries Inc. disclaims any liability for loss or damage incurred in connection with the use of this substance.