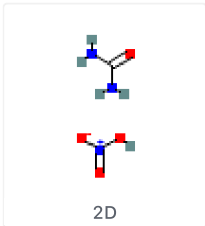



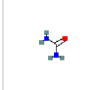


COMPOUND SUMMARY

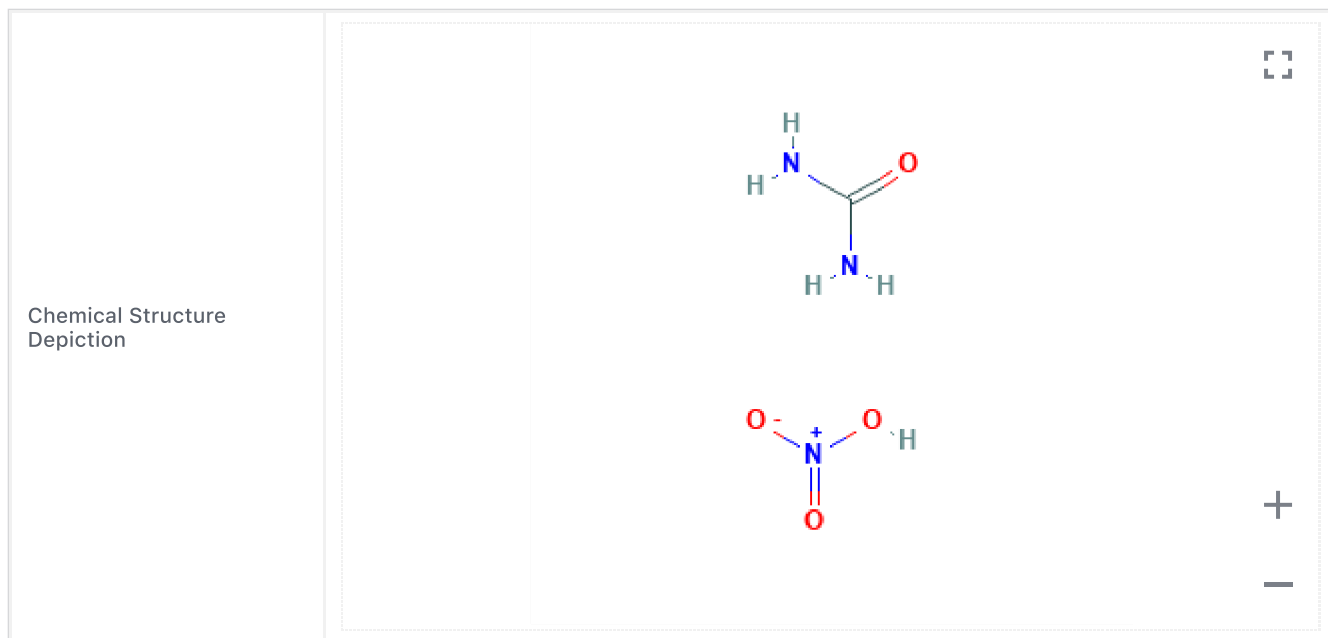
Urea nitrate

PubChem CID:	31295
Structure:	 2D Find Similar Structures
Chemical Safety:	  Flammable Irritant Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula:	CH ₅ N ₃ O ₄
Synonyms:	UREA NITRATE 124-47-0 UNII-DHJ35702MG DHJ35702MG Acidogen nitrate More...
Molecular Weight:	123.07 g/mol
Component Compounds:	 CID 944 (Nitric acid)  CID 1176 (Urea)
Dates:	Modify: 2020-08-22 Create: 2005-08-08

1 Structures



1.1 2D Structure



► [PubChem](#)

1.2 3D Status



Conformer generation is disallowed since mixture or salt

► [PubChem](#)

2 Names and Identifiers



2.1 Computed Descriptors



2.1.1 IUPAC Name



nitric acid;urea

Computed by LexiChem 2.6.6 (PubChem release 2019.06.18)

▶ [PubChem](#)

2.1.2 InChI



InChI=1S/CH₄N₂O.HNO₃/c2*2-1(3)4/h(H4,2,3,4);(H,2,3,4)

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

▶ [PubChem](#)

2.1.3 InChI Key



AYTGUZPQPXGYFS-UHFFFAOYSA-N

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

▶ [PubChem](#)

2.1.4 Canonical SMILES



C(=O)(N)N.[N+](=O)(O)[O-]

Computed by OEChem 2.1.5 (PubChem release 2019.06.18)

▶ [PubChem](#)

2.2 Molecular Formula



CH₅N₃O₄

Computed by PubChem 2.1 (PubChem release 2019.06.18)

▶ [PubChem](#)

2.3 Other Identifiers



2.3.1 CAS



124-47-0

▶ [ChemIDplus](#); [European Chemicals Agency \(ECHA\)](#); [Hazardous Substances Data Bank \(HSDB\)](#)

2.3.2 Deprecated CAS



17687-37-5

▶ [ChemIDplus](#)

2.3.3 European Community (EC) Number



204-703-5

- ▶ European Chemicals Agency (ECHA)

2.3.4 UN Number



1357

- ▶ NJDOH RTK Hazardous Substance List

2.3.5 UNII



DHJ35702MG

- ▶ FDA/SPL Indexing Data

2.3.6 Wikipedia



Urea nitrate

- ▶ Wikipedia

2.4 Synonyms



2.4.1 MeSH Entry Terms



urea nitrate

- ▶ MeSH

2.4.2 Depositor-Supplied Synonyms



UREA NITRATE	EINECS 241-672-7
124-47-0	Carbamimidic acid--nitric acid (1/1)
UNII-DHJ35702MG	U0015
DHJ35702MG	Q424712
Acidogen nitrate	Urea nitrate, wetted with not <20% water, by mass
Urea nitrate (wet)	Urea nitrate, dry or wetted with < 20% water, by mass
HSDB 1021	Urea nitrate, dry or wetted with <20% water, by mass
EINECS 204-703-5	Urea nitrate, dry or wetted with <20% water, by mass [UN0220] [Explosive 1.1D]
UN0220	Urea nitrate, wetted with not <20% water, by mass [UN1357] [Flammable solid]
UN1357	
SCHEMBL237222	
CTK0H5503	
DTXSID60924672	

- ▶ PubChem

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	123.07 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Hydrogen Bond Donor Count	3	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Hydrogen Bond Acceptor Count	4	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Rotatable Bond Count	0	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Exact Mass	123.028006 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Monoisotopic Mass	123.028006 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Topological Polar Surface Area	135 Å ²	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Heavy Atom Count	8	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	53.8	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	0	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	2	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2019.01.04)

► [PubChem](#)

3.2 Experimental Properties



3.2.1 Color/Form



Monoclinic leaflets from [water](#)

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-156

► [Hazardous Substances Data Bank \(HSDB\)](#)

White leaflets

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

► [Hazardous Substances Data Bank \(HSDB\)](#)

Colorless crystals

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1306

► [Hazardous Substances Data Bank \(HSDB\)](#)

Crystalline solid

TNA/DHS; News & Terrorism. Communicating in a Crisis. A fact sheet from The National Academies and the U.S. Dept of Homeland Security. IED Attack. Washington, DC: US Dept Homeland Sec. Available from, as of April 28, 2010: http://www.dhs.gov/xlibrary/assets/prep_ied_fact_sheet.pdf

► [Hazardous Substances Data Bank \(HSDB\)](#)

Colorless minerals or prisms

Lewis, R.J. Sr. (ed) *Sax's Dangerous Properties of Industrial Materials*. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.2 Odor



Odorless

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.3 Melting Point



152 °C (decomposes)

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.4 Solubility



In alcohol, 1.35 g/100 g at 0 °C, 8.84 g/100 g at 65.3 °C

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Insoluble in nitric acid

Lewis, R.J. Sr. (ed) *Sax's Dangerous Properties of Industrial Materials*. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

In water, 9.30 g/100 g at 0 °C, 39.84 g/100 g at 65.3 °C

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.5 Density



1.690 g/cu cm at 20 °C

Lide, D.R. *CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008*. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-516

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.6 Vapor Pressure



7.59X10-8 mm Hg at 25 °C (est)

US EPA; *Estimation Program Interface (EPI) Suite*. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010: <http://www.epa.gov/oppt/exposure/pubs/episutedl.htm>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.7 LogP



log Kow = -3.51 (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010:
<http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.8 Decomposition



When heated to decomp ... emits toxic fumes of /nitroxides/.

Lewis, R.J. Sr. (ed) *Sax's Dangerous Properties of Industrial Materials*. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Decomposes at 152 °C

Lewis, R.J. Sr.; *Hawley's Condensed Chemical Dictionary 15th Edition*. John Wiley & Sons, Inc. New York, NY 2007., p. 1306

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.9 pH



Aqueous solution is acid

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.10 Other Experimental Properties



When heated to decomposition it emits toxic fumes of NOx.

Lewis, R.J. Sr. (ed) *Sax's Dangerous Properties of Industrial Materials*. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Readily decomposes to [urea](#) and [nitric acid](#) in presence of [water](#)

Tamiri T et al; *Anal Bioanal Chem* 395: 421-8 (2009)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Henry's law constant = 1.7X10⁻¹⁷ atm-cu m/mol at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010:
<http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

4 Spectral Information



4.1 1D NMR Spectra



4.1.1 1H NMR Spectra



Instrument Name	Varian CFT-20
Copyright	Copyright © 2009-2018 Bio-Rad Laboratories, Inc. All Rights Reserved.
Thumbnail	

▶ [SpectraBase](#)

4.2 IR Spectra



IR Spectra	IR: 9795 (Sadtler Research Laboratories Prism Collection)
------------	---

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

5 Related Records



5.1 Related Compounds with Annotation

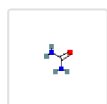


▶ PubChem

5.2 Component Compounds



CID 944 (Nitric acid)



CID 1176 (Urea)

▶ PubChem

5.3 Related Compounds



Mixtures, Components, and Neutralized Forms	2 Records
Similar Compounds	5 Records

▶ PubChem

5.4 Substances



5.4.1 Related Substances



Same	29 Records
------	------------

▶ PubChem

5.4.2 Substances by Category



► [PubChem](#)

6 Chemical Vendors



▶ [PubChem](#)

7 Use and Manufacturing



7.1 Use Classification



Fire Hazards -> Flammable - 2nd degree, Reactive - 3rd degree

- ▶ [NJDOH RTK Hazardous Substance List](#)

7.2 Uses



Use to solubilize mineral phosphates in soils ... Use for nitration of aromatic amines ... As sensitizer for explosives; ... organic reagent

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 1696

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

In explosives; manufacture of [urethane](#)

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1306

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Fertilizer

TNA/DHS; News & Terrorism. Communicating in a Crisis. A fact sheet from The National Academies and the U.S. Dept of Homeland Security. IED Attack. Washington, DC: US Dept Homeland Sec. Available from, as of April 28, 2010: http://www.dhs.gov/xlibrary/assets/prep_ied_fact_sheet.pdf

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

7.3 Methods of Manufacturing



By adding an excess of [nitric acid](#) to a strong aqueous solution of [urea](#).

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 1306

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8 Safety and Hazards





8.1 Hazards Identification



8.1.1 GHS Classification



Showing 1 of 2 [View More](#)

Pictogram(s)	  Flammable Irritant
Signal	Warning
GHS Hazard Statements	The GHS information provided by 1 company from 1 notification to the ECHA C&L Inventory. H228 (100%): Flammable solid [Danger Flammable solids] H319 (100%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]
Precautionary Statement Codes	P210, P240, P241, P264, P280, P305+P351+P338, P337+P313, and P370+P378 (The corresponding statement to each P-code can be found at the GHS Classification page.)

▶ [European Chemicals Agency \(ECHA\)](#)

8.1.2 Hazard Classes and Categories



Flam. Sol. 1 (100%)

Eye Irrit. 2 (100%)

▶ [European Chemicals Agency \(ECHA\)](#)

Explosives - Division 1.1

Serious eye damage/eye irritation - Category 3

Respiratory sensitization - Category 2B

Specific target organ toxicity - Repeated exposure - Category 3 (Respiratory tract irritation)

▶ [NITE-CMC](#)

8.1.3 Fire Hazards



Flammable - 2nd degree, Reactive - 3rd degree

▶ [NJDOH RTK Hazardous Substance List](#)

8.1.4 Fire Potential



Flammable when exposed to heat or flame.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.1.5 Skin, Eye, and Respiratory Irritations



Mildly irritating to skin, eyes, and mucous membranes. /Urea nitrate, wetted with not less than 10% **water** by mass/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

8.2 Safety and Hazard Properties



8.2.1 Explosive Limits and Potential



Under prolonged exposure to fire or heat /it/ can explode. /Urea nitrate, dry/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

It has a tendency to explode if boiled dry. /Urea nitrate, wetted with not less than 10% **water** by mass/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

The dry material is a high explosive.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

The dry **nitrate** may explode when heated.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

8.3 Fire Fighting



8.3.1 Fire Fighting Procedures



If material on fire or involved in fire: Dangerously explosive. Do not fight fires in a cargo of explosives. Evacuate area and let burn. /Urea nitrate, dry/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

Evacuation: If the material is on fire or involved in fire consider evacuation of one (1) mile radius. /Urea nitrate, dry/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

If material on fire or involved in fire: Solid streams of **water** may spread fire. Use **water** in flooding quantities as fog. Use dry chemical, **graphite**, or dry earth. /Urea nitrate, wetted with not less than 10% **water** by mass/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

If material on fire or involved in fire: Dangerously explosive. Flood with **water**. Cool all affected containers with flooding quantities of **water**. Apply **water** from as far a distance as possible. /Urea nitrate, wetted with not less than 30% **water** by mass/

Association of American Railroads; Bureau of Explosives. *Emergency Handling of Hazardous Materials in Surface Transportation*. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

Wear positive pressure self-contained breathing apparatus when fighting fires involving this material.

Association of American Railroads; Bureau of Explosives. *Emergency Handling of Hazardous Materials in Surface Transportation*. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

8.3.2 Firefighting Hazards



The primary hazard is from blast effect where the entire load can explode instantaneously and not from flying projectiles and fragments. /Urea nitrate, dry/

Association of American Railroads; Bureau of Explosives. *Emergency Handling of Hazardous Materials in Surface Transportation*. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

8.4 Accidental Release Measures



8.4.1 Disposal Methods



SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or [water](#); effects on animal and plant life; and conformance with environmental and public health regulations.

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

8.4.2 Preventive Measures



SRP: The scientific literature for the use of contact lenses by industrial workers is inconsistent. The benefits or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place.

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

If material not on fire and not involved in fire: Keep sparks, flames, and other sources of ignition away. Keep spilled material wet. Wet spilled material before picking it up. Do not attempt to sweep up dry material. /Urea nitrate, dry/

Association of American Railroads; Bureau of Explosives. *Emergency Handling of Hazardous Materials in Surface Transportation*. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

If material not on fire and not involved in fire: Keep sparks, flames, and other sources of ignition away. Keep material out of [water](#) sources and sewers. Cover all suspected material with wet sand or earth to prevent ignition until material can be permanently disposed of. /Urea nitrate, wetted with not less than 10% [water](#) by mass/

Association of American Railroads; Bureau of Explosives. *Emergency Handling of Hazardous Materials in Surface Transportation*. Association of American Railroads, Pueblo, CO. 2005, p. 926

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

Personnel protection: Avoid breathing dusts, and fumes from burning material ... Do not handle broken packages unless wearing appropriate personal protective equipment. Wash away any material which may have contacted the body with copious amounts of [water](#) or soap and [water](#). /Urea nitrate, dry; urea nitrate, wetted with not less than 10% [water](#) by mass/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

If material not on fire and not involved in fire: Keep sparks, flames, and other sources of ignition away. Keep material out of [water](#) sources and sewers. Keep spilled material wet. Do not attempt to sweep up dry material. /Urea nitrate, wetted with not less than 30% [water](#) by mass/

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.5 Exposure Control and Personal Protection



8.5.1 Personal Protective Equipment (PPE)



Wear appropriate chemical protective gloves and goggles.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.6 Stability and Reactivity



8.6.1 Hazardous Reactivities and Incompatibilities



The presence of heavy metals (e.g., lead, [iron](#)) catalyzes the thermal decomposition of urea nitrate.

Lewis, R.J. Sr. (ed) Sax's Dangerous Properties of Industrial Materials. 11th Edition. Wiley-Interscience, Wiley & Sons, Inc. Hoboken, NJ. 2004., p. 3648

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.7 Transport Information



8.7.1 DOT Emergency Guidelines



/GUIDE 113: FLAMMABLE SOLIDS - TOXIC (WET/DESENSITIZED EXPLOSIVE)/ Fire or Explosion:

Flammable/combustible material. May be ignited by heat, sparks or flames. DRIED OUT material may explode if exposed to heat, flame, friction or shock; treat as an explosive (GUIDE 112). Keep material wet with [water](#) or treat as an explosive (Guide 112). Runoff to sewer may create fire or explosion hazard. /Urea nitrate, wetted with not less than 10% [water](#); Urea nitrate, wetted with not less than 20% [water](#)/

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 113: FLAMMABLE SOLIDS - TOXIC (WET/DESENSITIZED EXPLOSIVE)/ Health: Some are toxic and may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution [water](#) may cause pollution. /Urea nitrate, wetted with not less than 10% [water](#); Urea nitrate, wetted with not less than 20% [water](#)/

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 113: FLAMMABLE SOLIDS - TOXIC (WET/DESENSITIZED EXPLOSIVE)/ Public Safety: CALL Emergency Response Telephone Number. ... Isolate spill or leak area immediately for at least 100 meters (330 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Ventilate closed spaces before entering. /Urea nitrate, wetted with not less than 10% [water](#); Urea nitrate, wetted with not less than 20% [water](#)/

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/GUIDE 113: FLAMMABLE SOLIDS - TOXIC (WET/DESENSITIZED EXPLOSIVE)/ Protective Clothing: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. /Urea nitrate, wetted with not less than 10% [water](#); Urea nitrate, wetted with not less than 20% [water](#)/

U.S. Department of Transportation. 2008 Emergency Response Guidebook. Washington, D.C. 2008

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more DOT Emergency Guidelines (Complete) data for Urea nitrate (8 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.7.2 Shipping Name/ Number DOT/UN/NA/IMO



UN 0220; Urea nitrate, dry or containing less than 20% [water](#); Urea nitrate, wet with 10% or more [water](#); Urea nitrate, wetted with not less than 20% [water](#)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 1357; Urea nitrate, dry or containing less than 20% [water](#); Urea nitrate, wet with 10% or more [water](#); Urea nitrate, wetted with not less than 20% [water](#)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.7.3 Shipment Methods and Regulations



No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

49 CFR 171.2 (7/1/96)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1997., p. 227-8

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.1134, 4068, 4067-2 (1988)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.8 Other Safety Information



8.8.1 Toxic Combustion Products



Toxic oxides of nitrogen are produced during combustion of this material.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 926

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9 Toxicity



9.1 Toxicological Information



9.1.1 Antidote and Emergency Treatment



Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing **water**. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Nitrates, nitrites, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 286

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer **oxygen** by nonrebreather mask at 10 to 15 L/min. Monitor for shock and treat if necessary Anticipate seizures and treat as necessary For eye contamination, flush eyes immediately with **water**. Irrigate each eye continuously with 0.9% saline (NS) during transport Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of **water** for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated **charcoal** /Nitrates, nitrites, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 286-7

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious or is in severe respiratory distress. Monitor cardiac rhythm and treat arrhythmias if necessary. Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's (LR) if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. If unresponsive to these measures, vasopressors may be helpful. Watch for signs of fluid overload Treat seizures with **diazepam** or **lorazepam** Administer 1% solution **methylene blue** if patient is symptomatic with severe hypoxia, cyanosis, and cardiac compromise not responding to **oxygen**. Use **proparacaine hydrochloride** to assist eye irrigation /Nitrates, nitrites, and related compounds/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 287

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.2 Human Toxicity Excerpts



/SIGNS AND SYMPTOMS/ /IT IS/ MILDLY IRRITATING TO SKIN, MUCOUS MEMBRANES.

The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 1410

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2 Ecological Information



9.2.1 Environmental Fate/Exposure Summary



Urea nitrate's production and use in explosives and as a chemical reagent may result in its release to the environment through various waste streams; its use as a fertilizer will result in its direct release to the environment. If released to air, an estimated vapor pressure of 7.59X10⁻⁸ mm Hg at 25 °C indicates urea nitrate will exist solely in the particulate phase in the atmosphere. Particulate-phase urea nitrate will be removed from the atmosphere by wet

or dry deposition. Urea nitrate does not contain chromophores that absorb at wavelengths >290 nm, and therefore is not expected to be susceptible to direct photolysis by sunlight. If released to soil, urea nitrate is expected to have very high mobility based upon an estimated Koc of 6.0. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.7×10^{-17} atm-cu m/mole. If released into [water](#), urea nitrate is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from [water](#) surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Biodegradation data were not available. An estimated BCF of 3.2 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions. Occupational exposure to urea nitrate may occur through inhalation of dust and dermal contact with this compound at workplaces where urea nitrate is produced or used. Use data indicate that the general population may be exposed to urea nitrate via dermal contact with this compound, particularly in locations where urea nitrate is used as a fertilizer. (SRC)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.2 Artificial Pollution Sources



Urea nitrate's production and use in explosives and as a chemical reagent(1) may result in its release to the environment through various waste streams; its use as a fertilizer(1) will result in its direct release to the environment(SRC).

(1) O'Neil MJ, ed; *The Merck Index. 14th ed., Whitehouse Station, NJ: Merck And Co, Inc., p. 1696 (2006)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.3 Environmental Fate



TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 6.0(SRC), determined from a structure estimation method(2), indicates that urea nitrate is expected to have very high mobility in soil(SRC). Volatilization of urea nitrate from moist soil surfaces is not expected to be an important fate process(SRC) given an estimated Henry's Law constant of 1.7×10^{-17} atm-cu m/mole(SRC), using a fragment constant estimation method(3). Urea nitrate is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 7.59×10^{-8} mm Hg at 25 °C(SRC), determined from a fragment constant method(4). Biodegradation data in soil were not available(SRC, 2010).

(1) Swann RL et al; *Res Rev 85: 17-28 (1983)* (2) US EPA; *Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html>* (3) Meylan WM, Howard PH; *Environ Toxicol Chem 10: 1283-93 (1991)* (4) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 6.0(SRC), determined from a structure estimation method(2), indicates that urea nitrate is not expected to adsorb to suspended solids and sediment(SRC). Volatilization from [water](#) surfaces is not expected(3) based upon an estimated Henry's Law constant of 1.7×10^{-17} atm-cu m/mole(SRC), developed using a fragment constant estimation method(4). According to a classification scheme(5), an estimated BCF of 3.2(SRC), from an estimated log Kow of -3.51(6) and a regression-derived equation(2), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Biodegradation data in [water](#) were not available(SRC, 2010).

(1) Swann RL et al; *Res Rev 85: 17-28 (1983)* (2) US EPA; *Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html>* (3) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990)* (4) Meylan WM, Howard PH; *Environ Toxicol Chem 10: 1283-93 (1991)* (5) Franke C et al; *Chemosphere 29: 1501-14 (1994)* (6) Meylan WM, Howard PH; *J Pharm Sci 84: 83-92 (1995)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), urea nitrate, which has an estimated vapor pressure of 7.59×10^{-8} mm Hg at 25 °C(SRC), determined from a fragment constant method(2), is expected to exist solely in the particulate phase in the ambient atmosphere. Particulate-phase urea nitrate may be removed from the air by wet or dry deposition(SRC). Urea nitrate does not

contain chromophores that absorb at wavelengths >290 nm(3), and therefore is not expected to be susceptible to direct photolysis by sunlight(SRC).

(1) Bidleman TF; *Environ Sci Technol* 22: 361-367 (1988) (2) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985) (3) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 8-12 (1990)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.4 Environmental Abiotic Degradation



Urea nitrate is not expected to undergo hydrolysis in the environment due to the lack of functional groups that hydrolyze under environmental conditions(1). Urea nitrate does not contain chromophores that absorb at wavelengths >290 nm(1), and therefore is not expected to be susceptible to direct photolysis by sunlight(SRC).

(1) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.5 Environmental Bioconcentration



An estimated BCF of 3.2 was calculated in fish for urea nitrate(SRC), using an estimated log Kow of -3.51(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

(1) Meylan WM, Howard PH; *J Pharm Sci* 84: 83-92 (1995) (2) US EPA; *Estimation Program Interface (EPI) Suite*. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html> (3) Franke C et al; *Chemosphere* 29: 1501-14 (1994)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.6 Soil Adsorption/Mobility



Using a structure estimation method based on molecular connectivity indices(1), the Koc of urea nitrate can be estimated to be 6.0(SRC). According to a classification scheme(2), this estimated Koc value suggests that urea nitrate is expected to have very high mobility in soil.

(1) US EPA; *Estimation Program Interface (EPI) Suite*. Ver. 4.0. Jan, 2009. Available from, as of June 9, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html> (2) Swann RL et al; *Res Rev* 85: 17-28 (1983)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.7 Volatilization from Water/Soil



The Henry's Law constant for urea nitrate is estimated as 1.7×10^{-17} atm-cu m/mole(SRC) using a fragment constant estimation method(1). This Henry's Law constant indicates that urea nitrate is expected to be essentially nonvolatile from water surfaces(2). Urea nitrate is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 7.59×10^{-8} mm Hg(SRC), determined from a fragment constant method(3).

(1) Meylan WM, Howard PH; *Environ Toxicol Chem* 10: 1283-93 (1991) (2) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (3) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.2.8 Other Environmental Concentrations



Occupational exposure to urea nitrate may occur through inhalation of dust and dermal contact with this compound at workplaces where urea nitrate is produced or used. Use data indicate that the general population may be exposed to urea nitrate via dermal contact with this compound, particularly in locations where urea nitrate is used as a fertilizer. (SRC)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10 Literature



10.1 NLM Curated PubMed Citations



▶ PubChem

10.2 Springer Nature References



▶ Springer Nature

10.3 Chemical Co-Occurrences in Literature



▶ [PubChem](#)

11 Patents



11.1 Depositor-Supplied Patent Identifiers



▶ PubChem

[Link to all deposited patent identifiers](#)

▶ PubChem

11.2 WIPO PATENTSCOPE



Patents are available for this chemical structure:

<https://patentscope.wipo.int/search/en/result.jsf?inchikey=AYTGUZPQPXGYFS-UHFFFAOYSA-N>

▶ PATENTSCOPE (WIPO)

12 Classification



12.1 Ontologies



12.1.1 MeSH Tree



▶ MeSH

12.1.2 WIPO IPC



▶ WIPO

12.1.3 ChemIDplus



► ChemIDplus

12.1.4 UN GHS Classification



► UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

12.1.5 NORMAN Suspect List Exchange Classification



► NORMAN Suspect List Exchange

13 Information Sources



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ALL SOURCES



1. ChemIDplus

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<https://www.nlm.nih.gov/copyright.html>*Urea nitrate*<https://chem.nlm.nih.gov/chemidplus/sid/0000124470>

ChemIDplus Chemical Information Classification

<https://chem.nlm.nih.gov/chemidplus/>

2. European Chemicals Agency (ECHA)

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<https://echa.europa.eu/web/guest/legal-notice>*urea nitrate*<https://echa.europa.eu/substance-information/-/substanceinfo/100.004.276>*Urea nitrate*<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/113115>

3. Hazardous Substances Data Bank (HSDB)

Urea nitrate<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/1021>

4. NITE-CMC

Urea nitrate - FY2007<https://www.nite.go.jp/chem/english/ghs/07-mhlw-0017e.html>

5. FDA/SPL Indexing Data

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<https://www.fda.gov/about-fda/about-website/website-policies#linking>*DHJ35702MG*<https://www.fda.gov/ForIndustry/DataStandards/SubstanceRegistrationSystem-UniqueIngredientIdentifierUNII/>

6. NJDOH RTK Hazardous Substance List

urea nitrate<http://nj.gov/health/eoh/rtkweb/documents/fs/1984.pdf>

7. SpectraBase

<https://spectrabase.com/spectrum/FYP9Ksqwzrn>

8. Springer Nature

<https://pubchem.ncbi.nlm.nih.gov/substance/341153997>

9. Wikipedia

urea nitratehttps://en.wikipedia.org/wiki/Urea_nitrate

10. PubChem

<https://pubchem.ncbi.nlm.nih.gov>

11. MeSH

urea nitrate<https://www.ncbi.nlm.nih.gov/mesh/67530477>

MeSH Tree

<http://www.nlm.nih.gov/mesh/meshhome.html>

12. **WIPO**

International Patent Classification

<http://www.wipo.int/classifications/ipc/>

13. **UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)**

GHS Classification Tree

http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

14. **NORMAN Suspect List Exchange**

NORMAN Suspect List Exchange Classification

<https://www.norman-network.com/nds/SLE/>

15. **PATENTSCOPE (WIPO)**

SID 403456000

<https://pubchem.ncbi.nlm.nih.gov/substance/403456000>