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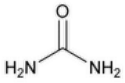
Urea



CH_4N_2O 60.06

Urea;

Carbamide CAS RN®: 57-13-6; UNII: 8W8T17847W.

DEFINITION

Urea contains NLT 98.0% and NMT 102.0% of urea (CH_4N_2O).

IDENTIFICATION

• **A.** **Spectroscopic Identification Tests** ⟨197⟩, *Infrared Spectroscopy*: **197K**

• **B.** The retention time of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.

ASSAY

• **Procedure**

Solution A: Transfer 1 mL of formic acid to a 1-L volumetric flask and dilute with water to volume.

Solution B: 100% Acetonitrile, passed through a membrane filter of 0.2-µm pore size

Mobile phase: See *Table 1*.

Table 1

Time (min)	Solution A (%)	Solution B (%)
0.0	2.5	97.5
7.0	10.0	90.0
7.01	2.5	97.5
15.0	2.5	97.5

Diluent: Acetonitrile and water (90:10)

System suitability solution: 0.01 mg/mL of USP Urea Related Compound A RS and 10 mg/mL of USP Urea RS in *Diluent*

Standard solution: 5 mg/mL of USP Urea RS in *Diluent*

Sample solution: 5 mg/mL of Urea in *Diluent*

Chromatographic system

(See *Chromatography* ⟨621⟩, *System Suitability*.)

Mode: LC

Detector: UV 195 nm

Column: 15-cm × 4.6-mm; 2.7-µm packing L86

Column temperature: 30°

Flow rate: 1 mL/min

Injection volume: 2 µL

System suitability

Sample: *System suitability solution*

[NOTE—The relative retention times for urea related compound A and urea are 0.9 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 1.5 between urea related compound A and urea

Relative standard deviation: NMT 1.0% for urea

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of urea (CH_4N_2O) in the portion of Urea taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response from the *Sample solution*

r_S = peak response from the *Standard solution*

C_S = concentration of USP Urea RS in the *Standard solution* (mg/mL)

C_U = concentration of Urea in the *Sample solution* (mg/mL)

Acceptance criteria: 98.0%–102.0%

IMPURITIES

- **RESIDUE ON IGNITION ⟨281⟩:** NMT 0.1%
- **ORGANIC IMPURITIES**

Solution A, Solution B, Mobile phase, Diluent, and **Chromatographic system:** Proceed as directed in the *Assay*.

System suitability solution: 0.01 mg/mL of USP Urea Related Compound A RS and 10 mg/mL of USP Urea RS in *Diluent*

Standard solution: 0.01 mg/mL of USP Urea RS and 0.01 mg/mL of USP Urea Related Compound A RS in *Diluent*

Sample solution: 10 mg/mL of Urea in *Diluent*

System suitability

Sample: *System suitability solution*

[NOTE—For the relative retention times, see *Table 2*.]

Suitability requirements

Resolution: NLT 1.5 between urea and urea related compound A

Relative standard deviation: NMT 1.0% for urea

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of urea related compound A in the portion of Urea taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response of urea related compound A from the *Sample solution*

r_S = peak response of urea related compound A from the *Standard solution*

C_S = concentration of USP Urea Related Compound A RS in the *Standard solution* (mg/mL)

C_U = concentration of Urea in the *Sample solution* (mg/mL)

Calculate the percentage of any individual unspecified impurity in the portion of Urea taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

r_U = peak response of any impurity from the *Sample solution*

r_S = peak response of urea from the *Standard solution*

C_S = concentration of USP Urea RS in the *Standard solution*

C_U = concentration of Urea in the *Sample solution*

Acceptance criteria: See *Table 2*. Disregard any impurity peaks less than 0.05%.

Table 2

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Urea related compound A	0.9	0.1
Urea	1.0	—
Any individual unspecified impurity	—	0.1
Total impurities	—	2.0

SPECIFIC TESTS

Change to read:

• **Alcohol-Insoluble Matter**

Sample solution: ▲Dissolve 5.0 g of Urea in 50 mL of warm alcohol.▲ (ERR 1-Nov-2023)

Analysis: If any insoluble residue remains, pass the *Sample solution* through a tared filter, wash the residue and the filter with 20 mL of warm alcohol▲ (ERR 1-Nov-2023) , and dry at 105° for 1 h.

Acceptance criteria: NMT 2 mg (0.04%)

• **Sterility Tests ⟨71⟩:** Where the label states that Urea is sterile, it meets the requirements.

• **Bacterial Endotoxins Test ⟨85⟩:** Where the label states that Urea must be subjected to further processing during the preparation of injectable dosage forms, it contains NMT 0.003 USP Endotoxin Units/mg of urea.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers. Store at 25°, excursions permitted between 15° and 30°.

• **Labeling:** Where it is intended for use in preparing injectable dosage forms, the label states that it is sterile or must be subjected to further processing during the preparation of injectable dosage forms.

• **USP Reference Standards ⟨11⟩**

USP Urea RS

USP Urea Related Compound A RS

Dicarbonimidic diamide.

$C_2H_5N_3O_2$ 103.08

Auxiliary Information - Please check for your question in the FAQs before contacting USP.

Topic/Question	Contact	Expert Committee
UREA	Documentary Standards Support	SM22020 Small Molecules 2
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	SM22020 Small Molecules 2

Chromatographic Database Information: Chromatographic Database

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