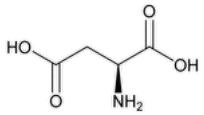
Status: Currently Official on 17-Feb-2025
Official Date: Official as of 01-Jun-2023
Document Type: USP Monographs
DocId: GUID-DE5BB200-2E28-47E1-88A8-B1E5FCDE8D7A_5_en-US
DOI: https://doi.org/10.31003/USPNF_M6198_05_01
DOI Ref: 34t07

Aspartic Acid



$C_4H_7NO_4$ 133.10

L-Aspartic acid CAS RN®: 56-84-8; UNII: 30KYC7MIAI.

DEFINITION
Aspartic Acid contains NLT 98.5% and NMT 101.5% of aspartic acid ($C_4H_7NO_4$), calculated on the dried basis.

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

ASSAY
• **Procedure**

Sample: 100 mg of Aspartic Acid

Titrimetric system

(See *Titrimetry* ⟨541⟩.)

Mode: Direct titration

Titrant: 0.1 N sodium hydroxide VS

Endpoint detection: Visual

Blank: 50 mL of carbon dioxide-free water. Add 0.1 mL of bromothymol blue TS.

Analysis: Transfer the *Sample* to a 125-mL flask, and dissolve in 50 mL of carbon dioxide-free water. Heat slightly if necessary. Cool, add 0.1 mL of bromothymol blue TS, and titrate with *Titrant* until the color changes from yellow to blue. Perform the blank determination. Calculate the percentage of aspartic acid ($C_4H_7NO_4$) in the portion of Aspartic Acid taken:

$$\text{Result} = [(V_S - V_B) \times N_A \times F \times 100]/W$$

V_S = *Titrant* volume consumed by the *Sample* (mL)

V_B = *Titrant* volume consumed by the *Blank* (mL)

N_A = actual normality of the *Titrant* (mEq/mL)

F = equivalency factor, 133.1 mg/mEq

W = *Sample* weight (mg)

Acceptance criteria: 98.5%–101.5% on the dried basis

IMPURITIES
• **Residue on Ignition ⟨281⟩:** NMT 0.1%
• **Chloride and Sulfate ⟨221⟩, *Chloride***

Sample solution: Dissolve 0.7 g of Aspartic Acid in 10 mL of diluted nitric acid, and dilute with water to 15 mL.

Acceptance criteria: The *Sample solution* shows no more chloride than corresponds to 0.20 mL of 0.020 N hydrochloric acid (NMT 0.02%).
• **Chloride and Sulfate ⟨221⟩, *Sulfate***

Sample solution: Dissolve 0.8 g of Aspartic Acid in 4 mL of hydrochloric acid, and dilute with water to 15 mL.

Acceptance criteria: The *Sample solution* shows no more sulfate than corresponds to 0.25 mL of 0.020 N sulfuric acid (NMT 0.03%).

Change to read:

• ▲**Iron ⟨241⟩, *Procedures, Procedure 1*▲** (CN 1-Jun-2023) **:** NMT 10 ppm

• **Related Compounds**

Mobile phase: 0.008 N sulfuric acid

System suitability solution: A mixture of 0.1 mg/mL of USP Fumaric Acid RS, 0.05 mg/mL of USP Maleic Acid RS, and 1.5 mg/mL of USP Malic Acid RS in water

Fumaric acid standard solution: 0.1 mg/mL of USP Fumaric Acid RS in water

Maleic acid standard solution: 0.05 mg/mL of USP Maleic Acid RS in water

Malic acid standard solution: 1.5 mg/mL of USP Malic Acid RS in water

Sample solution: Transfer 10 g of Aspartic Acid to a 100-mL volumetric flask, add 15–20 mL of 6 N hydrochloric acid, and mix to dissolve. Dilute with water to volume.

Chromatographic system

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

Mode: LC

Detector: UV 214 nm

Column: 7.8-mm × 30-cm; 9-µm packing L17

Column temperature: 30°

Flow rate: 0.6 mL/min

Injection volume: 10 µL

System suitability

Sample: *System suitability solution*

[Note—See *Table 1* for the relative retention times.]

Suitability requirements

Resolution: NLT 1.5 between maleic acid and malic acid

Relative standard deviation: NMT 10.0% each for maleic acid, malic acid, and fumaric acid

Analysis

Samples: *Standard solutions* and *Sample solution*

[Note—A hydrochloric acid peak at around 6–7 min may be observed in the chromatogram of the *Sample solution*. Disregard this peak in the calculation of the impurity.]

Calculate the percentage of each specified acid in the portion of Aspartic Acid taken:

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

r_U = peak response of maleic acid, malic acid, or fumaric acid from the *Sample solution*

r_S = peak response of maleic acid, malic acid, or fumaric acid from the corresponding *Standard solution*

C_S = concentration of USP Maleic Acid RS, USP Malic Acid RS, or USP Fumaric Acid RS in the corresponding *Standard solution* (mg/mL)

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

Calculate the percentage of any unspecified impurity in the portion of Aspartic Acid taken:

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

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

r_S = peak response of fumaric acid from the *Fumaric acid standard solution*

C_S = concentration of USP Fumaric Acid RS in the *Fumaric acid standard solution* (mg/mL)

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

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Maleic acid	0.5	0.05
Malic acid	0.6	0.20
Fumaric acid	1.0	0.10
Aspartic acid	Not observed	—

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Any unspecified impurity	—	0.05
Total unspecified impurities	—	0.10

SPECIFIC TESTS

• **Optical Rotation** ⟨781S⟩, *Procedures*, *Specific Rotation*
Sample solution: 80 mg/mL in 6 N hydrochloric acid
Acceptance criteria: +24.0° to +26.0°, at 20°

• **Loss on Drying** ⟨731⟩
Analysis: Dry at 105° for 3 h.
Acceptance criteria: NMT 0.5%

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers, and store protected from light.

• **USP Reference Standards** ⟨11⟩
USP Aspartic Acid RS
USP Fumaric Acid RS
USP Maleic Acid RS
USP Malic Acid RS

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

Topic/Question	Contact	Expert Committee
ASPARTIC ACID	Fatkhulla K Tadjimukhamedov Associate Scientific Liaison	NBDS2020 Non-botanical Dietary Supplements
REFERENCE STANDARD SUPPORT	RS Technical Services RSTECH@usp.org	NBDS2020 Non-botanical Dietary Supplements

Chromatographic Database Information: Chromatographic Database

Most Recently Appeared In:
Pharmacopeial Forum: Volume No. PF 42(2)

Current DocID: GUID-DE5BB200-2E28-47E1-88A8-B1E5FCDE8D7A_5_en-US
DOI: https://doi.org/10.31003/USPNF_M6198_05_01
DOI ref: 34t07