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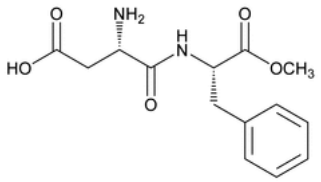
Aspartame



$C_{14}H_{18}N_2O_5$ 294.30

L-Phenylalanine, *N*-L-α-aspartyl-, 1-methyl ester;

3-Amino-*N*-(α-carboxyphenethyl)succinamic acid *N*-methyl ester CAS RN®: 22839-47-0.

DEFINITION

Aspartame contains NLT 98.0% and NMT 102.0% of aspartame ($C_{14}H_{18}N_2O_5$), calculated on the dried basis.

IDENTIFICATION

Change to read:

• **A.** ▲**Spectroscopic Identification Tests ⟨197⟩, *Infrared Spectroscopy*: 197M**▲ (CN 1-May-2020)

[Note—Do not dry specimens.]

ASSAY

• **Procedure**

Buffer: 0.05 M monobasic potassium phosphate, adjusted with phosphoric acid to a pH of 4.3

Mobile phase: Methanol and *Buffer* (18:82)

Diluent: Methanol and water (1:9)

System suitability solution: 0.1 mg/mL each of USP Aspartame Related Compound A RS and USP L-Phenylalanine RS in *Diluent*

Standard solution: 0.5 mg/mL of USP Aspartame RS in *Diluent*

Sample solution: 0.5 mg/mL of Aspartame in *Diluent*. [Note—Avoid heat and excessive holding times.]

Chromatographic system

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

Mode: LC

Detector: UV 210 nm

Column: 4.6-mm × 25-cm; 5-µm packing L1

Column temperature: 40°

Flow rate: 2 mL/min

Injection volume: 20 µL

Run time: 30 min

System suitability

Samples: *System suitability solution* and *Standard solution*

[Note—The relative retention times for the L-phenylalanine and aspartame related compound A peaks are 0.6 and 1.0, respectively.]

Suitability requirements

Resolution: NLT 8 between the L-phenylalanine and aspartame related compound A peaks, *System suitability solution*

Tailing factor: NMT 1.5, *Standard solution*

Relative standard deviation: NMT 1.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of aspartame ($C_{14}H_{18}N_2O_5$) in the portion of Aspartame taken:

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

r_U = peak area of aspartame from the *Sample solution*

r_S = peak area of aspartame from the *Standard solution*

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

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

Acceptance criteria: 98.0%–102.0% on the dried basis

IMPURITIES

- **Residue on Ignition ⟨281⟩:** NMT 0.2%

- **Limit of 5-Benzyl-3,6-dioxo-2-piperazineacetic Acid**

Mobile phase, Diluent, System suitability solution, and **Chromatographic system:** Proceed as directed in the *Assay*.

Standard solution: 75 µg/mL of USP Aspartame Related Compound A RS in *Diluent*

Sample solution: 5 mg/mL of Aspartame in *Diluent*. [Note—Avoid heat and excessive holding times.]

System suitability

Samples: *System suitability solution* and *Standard solution*

Suitability requirements

Resolution: NLT 8 between the L-phenylalanine and aspartame related compound A peaks, *System suitability solution*

Tailing factor: NMT 2.0, *Standard solution*

Relative standard deviation: NMT 4.0%, *Standard solution*

Analysis

Samples: *Standard solution* and *Sample solution*

[Note—Continue the elution of the *Sample solution* for 45 min.]

Calculate the percentage of aspartame related compound A in the portion of Aspartame taken:

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

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

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

C_S = concentration of 5-benzyl-3,6-dioxo-2-piperazineacetic acid in the *Standard solution* (mg/mL)

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

Acceptance criteria: NMT 1.5%

- **Chromatographic Purity**

Mobile phase, Diluent, System suitability solution, and **Chromatographic system:** Proceed as directed in the *Assay*.

Sample stock solution: Proceed as directed in the *Sample solution* in the test for *Limit of 5-Benzyl-3,6-dioxo-2-piperazineacetic Acid*.

Sample solution: 0.1 mg/mL of Aspartame from the *Sample stock solution* in *Diluent*

System suitability

Sample: *System suitability solution*

Suitability requirements

Resolution: NLT 8 between the L-phenylalanine and aspartame related compound A peaks, *System suitability solution*

Analysis

Samples: *Sample stock solution* and *Sample solution*

[Note—Continue the elution of the *Sample stock solution* for 45 min.]

Acceptance criteria: The sum of all of the peak responses of the *Sample stock solution*, excluding the 5-benzyl-3,6-dioxo-2-piperazineacetic acid and aspartame peak responses, is NMT the aspartame peak response of the *Sample solution*, corresponding to NMT 2.0% of chromatographic impurities.

SPECIFIC TESTS

- **Transmittance**

Sample solution: 10 mg/mL of Aspartame in 2 N hydrochloric acid, prepared by means of sonication

Analysis: Determine the transmittance in a 1-cm cell at 430 nm with a suitable spectrophotometer.

Acceptance criteria: Transmittance of NLT 0.95, corresponding to an absorbance of NMT about 0.022

- **Optical Rotation, *Specific Rotation* ⟨781S⟩**

Sample solution: 40 mg/mL in 15 N formic acid

Acceptance criteria: +14.5° to +16.5°, determined at 20° within 30 min after preparation of the *Sample solution*

- **Loss on Drying ⟨731⟩**

Analysis: Dry at 105° for 4 h.

Acceptance criteria: NMT 4.5%

ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Preserve in well-closed containers.
- **USP Reference Standards** ⟨11⟩

USP Aspartame RS

USP Aspartame Related Compound A RS

5-Benzyl-3,6-dioxo-2-piperazineacetic acid.

$C_{13}H_{14}N_2O_4$ 262.27

USP L-Phenylalanine RS

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

Topic/Question	Contact	Expert Committee
ASPARTAME	Documentary Standards Support	SE2020 Simple Excipients

Chromatographic Database Information: Chromatographic Database

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