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Acetaminophen, Chlorpheniramine Maleate, and Dextromethorphan Hydrobromide Tablets

DEFINITION

Acetaminophen, Chlorpheniramine Maleate, and Dextromethorphan Hydrobromide Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of acetaminophen ($C_8H_9NO_2$), chlorpheniramine maleate ($C_{16}H_{19}ClN_2 \cdot C_4H_4O_4$), and dextromethorphan hydrobromide monohydrate ($C_{18}H_{25}NO \cdot HBr \cdot H_2O$).

IDENTIFICATION

- A.** The retention time of the major peak for acetaminophen of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay for *Acetaminophen*.
- B.** The retention time of the major peak for chlorpheniramine of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay for *Chlorpheniramine Maleate*.
- C.** The retention time of the major peak for dextromethorphan of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the Assay for *Dextromethorphan Hydrobromide*.

ASSAY

• ACETAMINOPHEN

Mobile phase: Methanol, glacial acetic acid, and [water](#) (20:1:79)

Standard solution: 0.5 mg/mL of [USP Acetaminophen RS](#) prepared as follows. Transfer an appropriate amount of [USP Acetaminophen RS](#) to a suitable volumetric flask and add [methanol](#) using 4% of the final volume. Mix until solution is complete and dilute with 0.1% [phosphoric acid](#) to volume.

Sample stock solution: Nominally 2 mg/mL of acetaminophen prepared as follows. Transfer a portion of powdered Tablets (NLT 20), equivalent to 100 mg of acetaminophen, to a 50-mL volumetric flask. Add 7.5 mL of [methanol](#), and sonicate to disperse the powder. Add 0.5 mL of [phosphoric acid](#), dilute with [water](#) to volume, and filter.

Sample solution: Nominally 0.5 mg/mL of acetaminophen from *Sample stock solution* in [water](#)

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: UV 280 nm

Column: 4.6-mm × 15-cm; 5-μm packing [L7](#)

Flow rate: 1 mL/min

Injection volume: 10 μL

System suitability

Sample: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of acetaminophen ($C_8H_9NO_2$) in the portion of Tablets taken:

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

r_U = peak response of acetaminophen from the *Sample solution*

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

C_S = concentration of [USP Acetaminophen RS](#) in the *Standard solution* (mg/mL)

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

Acceptance criteria: 90.0%–110.0% of the labeled amount of acetaminophen ($C_8H_9NO_2$)

• CHLORPHENIRAMINE MALEATE

Mobile phase: Methanol and [water](#) (60:40) containing 0.34 g of [monobasic potassium phosphate](#), 0.3 g of [triethylamine hydrochloride](#), 0.15 g of sodium lauryl sulfate, and 0.1 mL of [phosphoric acid](#) in each 100 mL of solution

Standard stock solution: 0.8 mg/mL of [USP Chlorpheniramine Maleate RS](#) in [water](#)

Standard solution: 8 µg/mL of [USP Chlorpheniramine Maleate RS](#) in 0.1% [phosphoric acid](#) from *Standard stock solution*

Sample solution: Nominally 8 µg/mL of chlorpheniramine maleate prepared as follows. Transfer a portion of powdered Tablets (NLT 20), equivalent to 2 mg of chlorpheniramine maleate, to a 250-mL volumetric flask. Add 25 mL of [methanol](#), and sonicate to disperse the powder. Add 1 mL of [phosphoric acid](#), dilute with [water](#) to volume, and filter.

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: UV 214 nm

Column: 4.6-mm × 15-cm; 5-µm packing [L11](#)

Flow rate: 2 mL/min

Injection volume: 10 µL

System suitability

Samples: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.5

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of chlorpheniramine maleate ($C_{16}H_{19}ClN_2 \cdot C_4H_4O_4$) in the portion of Tablets taken:

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

r_U = peak response of chlorpheniramine from the *Sample solution*

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

C_S = concentration of [USP Chlorpheniramine Maleate RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of chlorpheniramine maleate in the *Sample solution* (mg/mL)

Acceptance criteria: 90.0%–110.0% of the labeled amount of chlorpheniramine maleate ($C_{16}H_{19}ClN_2 \cdot C_4H_4O_4$)

• DEXTROMETHORPHAN HYDROBROMIDE

Mobile phase, Chromatographic system, and System suitability: Proceed as directed in the Assay for *Chlorpheniramine Maleate*.

Standard stock solution: 0.6 mg/mL of [USP Dextromethorphan Hydrobromide RS](#) in [water](#)

Standard solution: 0.06 mg/mL of [USP Dextromethorphan Hydrobromide RS](#) in 0.1% [phosphoric acid](#), from *Standard stock solution*

Sample solution: Nominally 0.06 mg/mL of dextromethorphan hydrobromide prepared as follows. Transfer a portion of powdered Tablets (NLT 20), equivalent to 6 mg of dextromethorphan hydrobromide, to a 100-mL volumetric flask. Add 10 mL of [methanol](#), and sonicate to disperse the powder. Add 0.4 mL of [phosphoric acid](#), dilute with [water](#) to volume, and filter.

System suitability

Samples: *Standard solution*

Suitability requirements

Tailing factor: NMT 2.5

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of dextromethorphan hydrobromide monohydrate ($C_{18}H_{25}NO \cdot HBr \cdot H_2O$) in the portion of Tablets taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times (M_{r1}/M_{r2}) \times 100$$

r_U = peak response of dextromethorphan from the *Sample solution*

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

C_S = concentration of [USP Dextromethorphan Hydrobromide RS](#) in the *Standard solution* (mg/mL)

C_U = nominal concentration of dextromethorphan hydrobromide in the *Sample solution* (mg/mL)

M_{r1} = molecular weight of dextromethorphan hydrobromide monohydrate, 370.32