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Benazepril Hydrochloride Tablets

DEFINITION

Benazepril Hydrochloride Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of benazepril hydrochloride ($C_{24}H_{28}N_2O_5 \cdot HCl$).

IDENTIFICATION

- **A.** The UV spectrum of the major peak of the *Sample solution* corresponds to that of the *Standard solution*, as obtained in the *Assay*.
- **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: Dissolve 0.81 g of tetrabutylammonium bromide in 360 mL of water containing 0.2 mL of acetic acid, glacial.

Mobile phase: Methanol and *Solution A* (64:36)

System suitability solution: 0.4 mg/mL each of USP Benazepril Hydrochloride RS and USP Benazepril Related Compound B RS in *Mobile phase*

Standard solution: 0.2 mg/mL of USP Benazepril Hydrochloride RS in *Mobile phase*

Sample solution: Nominally 0.2 mg/mL of benazepril hydrochloride in *Mobile phase* prepared as follows. Transfer a portion from NLT 20 finely powdered Tablets, equivalent to 50 mg of benazepril hydrochloride, to a 250-mL volumetric flask. Add 150 mL of *Mobile phase*, and shake by mechanical means for 30 min. Dilute with *Mobile phase* to volume, mix, and centrifuge. Pass an aliquot of the supernatant through a suitable filter, discarding the first 6 mL of the filtrate.

Chromatographic system

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

Mode: LC

Detector: UV 240 nm. For *Identification A*, use a diode array detector in the range of 200–400 nm.

Columns

Guard: 4.6-mm × 3-cm; 7-µm packing L7

Analytical: 3.9-mm × 30-cm; 10-µm packing L1

Flow rate: 1 mL/min

Injection volume: 25 µL

Run time: NLT 3 times the retention time of benazepril

System suitability

Sample: *System suitability solution*

[Note—The relative retention times for benazepril and benazepril related compound B peaks are about 1.0 and 1.5, respectively.]

Suitability requirements

Resolution: NLT 2.0 between benazepril and benazepril related compound B peaks

Relative standard deviation: NMT 2.0% for both benazepril and benazepril related compound B peaks

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of benazepril hydrochloride ($C_{24}H_{28}N_2O_5 \cdot HCl$) in the portion of Tablets taken:

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

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

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

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

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

Acceptance criteria: 90.0%–110.0%

PERFORMANCE TESTS

- **Dissolution ⟨711⟩**

Test 1

Medium: Water; 500 mL

Apparatus 2: 50 rpm

Time: 30 min

Solution A, Mobile phase, System suitability solution, and **System suitability:** Proceed as directed in the *Assay*.

Standard solution: 0.02 µg/µL of USP Benazepril Hydrochloride RS in *Medium*

Sample solution: Pass a portion of the solution under test through a suitable filter. [NOTE—The amount of benazepril injected should not exceed 125% of the quantity of the *Standard solution* (1.5 µg).]

Chromatographic system: Proceed as directed in the *Assay*, except for the *Injection volume*.

Injection volume: 25 µL for *System suitability solution*; 60 µL for *Standard solution* and *Sample solution*

Analysis

Samples: *Standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of benazepril hydrochloride ($C_{24}H_{28}N_2O_5 \cdot HCl$) dissolved:

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

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

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

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

L = label claim (mg/Tablet)

V = volume of *Medium*, 500 mL

Tolerances: NLT 80% (Q) of the labeled amount of benazepril hydrochloride ($C_{24}H_{28}N_2O_5 \cdot HCl$) is dissolved.

Test 2: If the product complies to this test, the labeling indicates that the product meets USP *Dissolution Test 2*.

Medium, Apparatus 2, Standard solution, Sample solution, Chromatographic system, and **Analysis:** Proceed as directed in *Dissolution Test 1*.

Solution A, Mobile phase, System suitability solution, and **System suitability:** Proceed as directed in the *Assay*.

Time: 45 min

Tolerances: NLT 70% (Q) of the labeled amount of benazepril hydrochloride ($C_{24}H_{28}N_2O_5 \cdot HCl$) is dissolved.

• **UNIFORMITY OF DOSAGE UNITS ⟨905⟩:** Meet the requirements

IMPURITIES

• **ORGANIC IMPURITIES**

Solution A, Mobile phase, System suitability solution, Sample solution, and **System suitability:** Proceed as directed in the *Assay*.

Standard solution: 0.006 mg/mL of USP Benazepril Related Compound C RS in *Mobile phase*

Chromatographic system: Proceed as directed in the *Assay*, except for the *Injection volume*.

Injection volume: 25 µL for *System suitability solution*; 80 µL for *Standard solution* and *Sample solution*

Analysis

Samples: *Sample solution* and *Standard solution*

Calculate the percentage of benazepril related compound C in the portion of Tablets taken:

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

r_U = peak response of benazepril related compound C from the *Sample solution*

r_S = peak response of benazepril related compound C from the *Standard solution*

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

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

Calculate the percentage of any unspecified impurity in the portion of Tablets taken:

$$\text{Result} = (r_U/r_T) \times 100$$

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

r_T = sum of the responses of all the peaks including benazepril related compound C from the *Sample solution*

Acceptance criteria: See *Table 1*.

Table 1

Name	Relative Retention Time	Acceptance Criteria, NMT (%)
Benazepril related compound C	0.6	3.0
Benazepril	1.0	—
Benazepril related compound B[a,b]	1.5	—
Any unspecified impurity	—	0.2
Total impurities[c]	—	2.0

[a] 2-[(*SR*)-3-{[(*RS*)-1-Ethoxy-1-oxo-4-phenylbutan-2-yl]amino}-2-oxo-2,3,4,5-tetrahydro-1*H*-benzo[*b*]azepin-1-yl]acetic acid.

[b] For identification only.

[c] Excluding benazepril related compound C.

ADDITIONAL REQUIREMENTS

• **Packaging and Storage:** Preserve in well-closed containers. Store at controlled room temperature.

• **Labeling:** When more than one *Dissolution* test is given, the labeling states the *Dissolution* test used only if *Test 1* is not used.

Change to read:

• **USP Reference Standards** ⟨11⟩

USP Benazepril Hydrochloride RS

USP Benazepril Related Compound B RS

▲2-[(*S*)-3-{[(*R*)-1-Ethoxy-1-oxo-4-phenylbutan-2-yl]amino}-2-oxo-2,3,4,5-tetrahydro-1*H*-benzo[*b*]azepin-1-yl]acetic acid hydrochloride;
Also known as▲ (ERR 1-Jul-2021) (3*S*)-3-[[(1*R*)-1-(Ethoxycarbonyl)-3-phenylpropyl]amino]-2,3,4,5-tetrahydro-2-oxo-1*H*-1-benzazepine-1-acetic acid, monohydrochloride.

$C_{24}H_{28}N_2O_5 \cdot HCl$ 460.95

USP Benazepril Related Compound C RS

(3*S*)-3-[[(1*S*)-1-Carboxy-3-phenylpropyl]amino-2,3,4,5-tetrahydro-2-oxo-1*H*-1-benzazepine]-1-acetic acid;
Also known as (*S*)-2-{[(*S*)-1-(Carboxymethyl)-2-oxo-2,3,4,5-tetrahydro-1*H*-benzo[*b*]azepin-3-yl]amino}-4-phenylbutanoic acid.

$C_{22}H_{24}N_2O_5$ 396.44

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

Topic/Question	Contact	Expert Committee
BENAZEPRIL HYDROCHLORIDE TABLETS	Documentary Standards Support	SM22020 Small Molecules 2

Chromatographic Database Information: Chromatographic Database

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