Edition: BP 2025 (Ph. Eur. 11.6 update)

Oxybutynin Oral Solution

General Notices

Action and use

Anticholinergic.

DEFINITION

Oxybutynin Oral Solution contains Oxybutynin Hydrochloride in a suitable vehicle.

The oral solution complies with the requirements stated under Oral Liquids and with the following requirements

Content of oxybutynin hydrochloride, $C_{22}H_{31}NO_3$,HCl

95.0 to 105.0% of the stated amount.

IDENTIFICATION

To a quantity of the oral solution containing 25 mg of Oxybutynin Hydrochloride add sufficient 2M *sodium hydroxide* to adjust to pH 12.0 and extract with four 20-mL quantities of *hexane*. Filter the collected hexane layers through *anhydrous sodium sulfate* (Whatman GF/C is suitable). Evaporate the filtrate to dryness under a current of nitrogen, to yield a clear, sticky liquid residue. The *infrared absorption spectrum* of the residue, Appendix II A, is concordant with the *reference spectrum* of oxybutynin *(RS 442)*.

TESTS

Related substances

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

(1) Mix a quantity of the oral solution containing 25 mg of Oxybutynin Hydrochloride with 40 mL of 0.01M *hydrochloric acid*, add sufficient 0.01M *hydrochloric acid* to produce 100 mL, mix and filter.
(2) 0.000375% w/v of *oxybutynin impurity A EPCRS* in 0.01M *hydrochloric acid*.
(3) 0.00025% w/v of *phenylcyclohexylglycolic acid BPCRS* in 0.01M *hydrochloric acid*.
(4) Dilute 1 volume of solution (1) to 200 volumes with 0.01M *hydrochloric acid*.
(5) 0.0000125% w/v of *oxybutynin impurity A EPCRS* in solution (4).

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (15 cm × 4.6 mm) packed with *octadecylsilyl silica gel for chromatography R1* (5 µm) (Symmetry C18 is suitable).
(b) Use gradient elution and the mobile phases described below.
(c) Use a flow rate of 1 mL per minute.
(d) Use an ambient column temperature.
(e) Use a detection wavelength of 210 nm.

(f) Inject 50 µL of each solution.
(g) When the chromatograms are recorded under the prescribed conditions the retention times are about 31 minutes for oxybutynin hydrochloride and about 47 minutes for oxybutynin impurity A.

MOBILE PHASE

Mobile phase A 0.34% w/v of *potassium dihydrogen orthophosphate* and 0.436% w/v of *dipotassium hydrogen orthophosphate*.

Mobile phase B *acetonitrile R1*.

Time (Minutes)	Mobile phase A (% v/v)	Mobile phase B (% v/v)	Comment
0-5	70	30	isocratic
5-6	70→45	30→55	linear gradient
6-50	45	55	isocratic
50-51	45→70	55→30	linear gradient
51-60	70	30	re-equilibration

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (5), the *resolution factor* between the peaks due to oxybutynin hydrochloride and oxybutynin impurity A is at least 10.0.

LIMITS

In the chromatogram obtained with solution (1):

the area of any peak corresponding to oxybutynin impurity A is not greater than the area of the principal peak in the chromatogram obtained with solution (2) (1.5%);

the area of any peak corresponding to phenylcyclohexylglycolic acid is not greater than half the area of the principal peak in the chromatogram obtained with solution (3) (0.5%);

the area of any other *secondary peak* is not greater than 0.4 times the area of the principal peak in the chromatogram obtained with solution (4) (0.2%);

the sum of the areas of any such s*econdary peaks* is not greater than the area of the principal peak in the chromatogram obtained with solution (4) (0.5%).

Disregard any peak with an area less than the area of the principal peak in the chromatogram obtained with solution (5) (0.05%).

ASSAY

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

(1) Mix a quantity of the oral solution containing 25 mg of Oxybutynin Hydrochloride with 400 mL of 0.01M *hydrochloric acid*, add sufficient 0.01M *hydrochloric acid* to produce 500 mL, mix and filter.
(2) 0.005% w/v of *oxybutynin hydrochloride BPCRS* in 0.01M *hydrochloric acid*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (15 cm × 4.6 mm) packed with *nitrile silica gel for chromatography R1* (5 µm) (Spherisorb CN is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 2 mL per minute.
(d) Use a column temperature of 40°.
(e) Use a detection wavelength of 200 nm.

(f) Inject 20 µL of each solution.

MOBILE PHASE

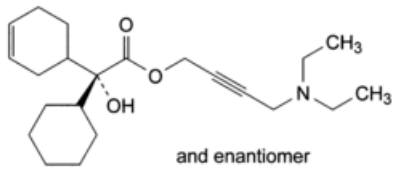
300 volumes of *acetonitrile R1* and 700 volumes of a 0.48% w/v solution of *anhydrous potassium dihydrogen orthophosphate* previously adjusted to pH 3.0 to 3.5 with *orthophosphoric acid*.

DETERMINATION OF CONTENT

Calculate the content of $C_{22}H_{31}NO_3$,HCl in the oral slution using the declared content of $C_{22}H_{31}NO_3$,HCl in *oxybutynin hydrochloride BPCRS*.

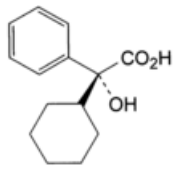
IMPURITIES

The impurities limited by the requirements of this monograph include:



and enantiomer

1. 4-(diethylamino)but-2-ynyl (*RS*)-2-(cyclohex-3-enyl)-2-cyclohexyl-2-hydroxyacetate (European Pharmacopoeia impurity A),



and enantiomer

2. (*RS*)-2-cyclohexyl-2-hydroxy-2-phenylacetic acid (phenylcyclohexylglycolic acid) (European Pharmacopoeia impurity D).