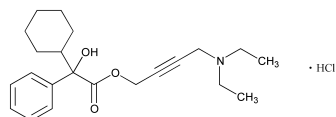


Oxybutynin Chloride



$C_{22}H_{31}NO_3 \cdot HCl$ 393.95

Benzeneacetic acid, α -cyclohexyl- α -hydroxy-, 4-(diethylamino)-2-butynyl ester hydrochloride, (\pm)-
4-(Diethylamino)-2-butynyl (\pm)- α -phenylcyclohexaneglycolate hydrochloride [1508-65-2].

» Oxybutynin Chloride contains not less than 97.0 percent and not more than 101.0 percent of $C_{22}H_{31}NO_3 \cdot HCl$, calculated on the dried basis.

Packaging and storage—Preserve in well-closed containers.

USP Reference standards (11)—*USP Oxybutynin Chloride RS*. *USP Oxybutynin Related Compound B RS*. *USP Oxybutynin Related Compound C RS*.

Identification, Infrared Absorption (197K).

Melting range (741): between 124° and 129°.

Loss on drying (731): Dry it at 105° for 2 hours: it loses not more than 3% of its weight.

Residue on ignition (281): not more than 0.1%.

Heavy metals, Method I (231): 0.002%.

Related compounds—

Phosphate buffer and Mobile phase—Prepare as directed in the Assay.

System suitability stock solution—Dissolve accurately weighed quantities of USP Oxybutynin Related Compound B RS and USP Oxybutynin Related Compound C RS in *Mobile phase* to obtain a solution having known concentrations of about 100 μ g of each USP Reference Standard per mL.

Standard stock solution—Dissolve an accurately weighed quantity of USP Oxybutynin Chloride RS in *Mobile phase* to obtain a solution having a known concentration of about 1.0 mg per mL.

System suitability solution—Transfer 10.0 mL of the *System suitability stock solution* to a 100-mL volumetric flask, add 10.0 mL of the *Standard stock solution*, and dilute with *Mobile phase* to volume.

Standard solution—Transfer 15.0 mL of the *Standard stock solution* to a 100-mL volumetric flask, and dilute with *Mobile phase* to volume. Transfer 5.0 mL of the solution obtained to a separate 100-mL volumetric flask, and dilute with *Mobile phase* to volume. This solution contains about 7.5 μ g of USP Oxybutynin Chloride RS per mL.

Test solution—Transfer about 50 mg of Oxybutynin Chloride, accurately weighed, to a 10-mL volumetric flask, dissolve in and dilute with *Mobile phase* to volume, and mix.

Chromatographic system—Prepare as directed in the Assay. Chromatograph the *System suitability solution*, and record the peak responses as directed for *Procedure*: the resolution, R , between oxybutynin related compound B and oxybutynin related compound C is not less than 1.1; and the relative standard deviation for replicate injections, determined from the oxybutynin peak, is not more than 2.0%.

Procedure—Separately inject equal volumes (about 10 μ L) of the *Standard solution* and the *Test solution* into the chromatograph, record the chromatograms for a total time of not less than twice the retention time of the oxybutynin peak, and measure all the peak responses (see *Table 1* for known impurities). Calculate the percentage of each impurity in the portion of Oxybutynin Chloride taken by the formula:

$$(C/W)(1/F)(r_U / r_S)$$

in which C is the concentration, in μ g per mL, of USP Oxybutynin Chloride RS in the *Standard solution*; W is the weight, in mg, of Oxybutynin Chloride taken to prepare the *Test solution*; F is the relative response factor for each impurity (see *Table 1* for the values); and r_U and r_S are the peak responses for each impurity ob-

tained from the *Test solution* and for the oxybutynin peak in the *Standard solution*, respectively. [NOTE—For unknown impurities, use the relative response factor of 1.0.]

Table 1

Compound Name	Relative Retention Time	Relative Response Factor (F)	Limit (%)
Oxybutynin related compound A ¹	0.08	1.4	0.5
Diphenyl analog of oxybutynin chloride ²	0.37	2.7	0.1
Oxybutynin related compound B ³	0.65	1.3	1.0
Oxybutynin related compound C ⁴	0.79	1.0	1.0
Cyclohexenyl analog of oxybutynin chloride ⁵	1.8	0.4	1.0
Ethylpropyl analog of oxybutynin chloride ⁶	1.9	1.0	0.1

¹Phenylcyclohexylglycolic acid (cyclohexylmandelic acid, or CHMA)

²4-(Diethylamino)but-2-ynyl 2-hydroxy-2,2-diphenylacetate

³Methyl ester of phenylcyclohexylglycolic acid (methyl ester of cyclohexylmandelic acid, or CHMME)

⁴Methylethyl analog of oxybutynin chloride (4-(ethylmethylamino) but-2-ynyl (\pm)-2-cyclohexyl-2-hydroxy-2-phenylacetate)

⁵4-(Diethylamino)but-2-ynyl (\pm)-2-(cyclohex-3-enyl)-2-cyclohexyl-2-hydroxyacetate

⁶4-(Ethylpropylamino)but-2-ynyl (\pm)-2-cyclohexyl-2-hydroxy-2-phenylacetate

In addition to not exceeding the limits for each impurity in *Table 1*, not more than 0.1% of any other single impurity is found; and not more than 1.0% of total impurities is found.

Organic volatile impurities, Method I (467): meets the requirements.

(Official until July 1, 2008)

Chloride content—Dissolve about 600 mg of oxybutynin chloride, previously dried and accurately weighed, in 100 mL of water, and add 5 mL of nitric acid. Titrate (see *Titrimetry* (541)) with 0.1 N silver nitrate VS, determining the endpoint potentiometrically, using a platinum-silver chloride electrode system. Each mL of 0.1 N silver nitrate is equivalent to 3.545 mg of Cl: the content is between 8% and 10%.

Assay—

Phosphate buffer—Dissolve about 6.67 g of monobasic potassium phosphate and 8.55 g of dibasic potassium phosphate in 1 L of water, and mix.

Mobile phase—Prepare a filtered and degassed mixture of *Phosphate buffer* and acetonitrile (51 : 49). Make adjustments if necessary (see *System Suitability* under *Chromatography* (621)).

Standard preparation—Dissolve an accurately weighed quantity of USP Oxybutynin Chloride RS in *Mobile phase*, and dilute quantitatively, and stepwise if necessary, with *Mobile phase* to obtain a solution having a known concentration of about 0.1 mg per mL.

Assay preparation—Transfer about 50 mg of Oxybutynin Chloride, accurately weighed, to a 10-mL volumetric flask, dissolve in and dilute with *Mobile phase* to volume, and mix. Transfer 2.0 mL of this solution to a separate 100-mL volumetric flask, dilute with *Mobile phase* to volume, and mix.

Chromatographic system (see *Chromatography* (621))—The liquid chromatograph is equipped with a 210-nm detector and a 3- μ m or 3.5- μ m, 4.6-mm \times 7.5-cm column that contains packing L7. The column temperature is maintained at 45°. The flow rate is about 1 mL per minute. Chromatograph the *Standard preparation*, and record the peak responses as directed for *Procedure*: the relative standard deviation for replicate injections is not more than 2.0%.

Procedure—Separately inject equal volumes (about 10 μ L) of the *Standard preparation* and the *Assay preparation* into the chromatograph, record the chromatograms, and measure the responses for the

major peaks. Calculate the quantity, in mg, of $C_{22}H_{31}NO_3 \cdot HCl$ in the portion of Oxybutynin Chloride taken by the formula:

$$CD(r_U / r_S)$$

in which C is the concentration, in mg per mL, of USP Oxybutynin Chloride RS in the *Standard preparation*; D is the dilution factor

for the *Assay preparation*; and r_U and r_S are the peak responses obtained from the *Assay preparation* and the *Standard preparation*, respectively.