Oxybutynin Chloride Extended-Release Tablets

Type of Posting	Revision Bulletin
Posting Date	27–Sep–2019
Official Date	01–Oct–2019
Expert Committee	Chemical Medicines Monographs 3
Reason for Revision	Compliance

In accordance with the Rules and Procedures of the 2015–2020 Council of Experts, the Chemical Medicines Monographs 3 Expert Committee has revised the Oxybutynin Chloride Extended-Release Tablets monograph. The purpose for this revision is to add *Dissolution Test 9* to accommodate FDA-approved drug products with different tolerances than the existing dissolution tests. In addition, *Procedure 2* has been added to the *Assay* to incorporate different *Diluent* and *Sample solution* preparations to accommodate a sponsor's *Assay* method for this drug product.

- *Dissolution Test 9* was validated using a Hypersil BDS C8 brand of L7 column. The typical retention time for oxybutynin is about 4.5 min.

- *Assay, Procedure 2* was validated using an Inertsil Phenyl brand of L11 column. The typical retention time for oxybutynin is about 5.5 min.

The revision also necessitates an update to the cross-references in the test for *Organic Impurities*.

The Oxybutynin Chloride Extended-Release Tablets Revision Bulletin supersedes the currently official monograph.

Should you have any questions, please contact Behnaz Almasi, Scientific Liaison (301-816-3412 or ba@usp.org).

PERFORMANCE TESTS

Change to read:

• **DISSOLUTION** ⟨711⟩

Test 1

Medium: Simulated gastric fluid without enzyme; 50 mL

Apparatus 7: See *Drug Release* ⟨724⟩, 30 cycles/min; 2–3-cm amplitude, at 37.0 ± 0.5°

Times: 4, 10, and 24 h

Solution A: 4.83 g/L of monobasic sodium phosphate in water. Add 2.3 mL/L of triethylamine, and adjust with phosphoric acid to a pH of 2.2 ± 0.2.

Mobile phase: Acetonitrile and *Solution A* (7:13)

Solution B: To 1 L of water add phosphoric acid dropwise to a pH of 3.5, and mix well.

Standard stock solutions: 250, 300, and 350 µg/mL of USP Oxybutynin Chloride RS in acetonitrile

Standard solutions: Prepare a series of dilutions of the *Standard stock solutions* in *Solution B* having final concentrations similar to those expected in the *Sample solution*.

System suitability solution: Use a medium range *Standard solution* of USP Oxybutynin Chloride RS.

Sample solution: Use portions of the solution under test. If the solution is cloudy, centrifuge at 2000 rpm for 10 min, and use the supernatant.

Chromatographic system

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

Mode: LC

Detector: UV 230 nm

Column: 4.6-mm × 5-cm; packing L11

Column temperature: 35°

Flow rate: 1.5 mL/min

Injection volume: 50 µL

System suitability

Sample: *System suitability solution*

Suitability requirements

Tailing factor: Greater than 0.5 and less than 2.5

Relative standard deviation: NMT 2.0%

Analysis

Samples: *Standard solutions* and *Sample solution*

Construct a calibration curve by plotting the peak response versus concentration of the *Standard solutions*. A weighing factor, $1/x$, is applied to the regression line of the calibration curve to enhance the accuracy of the low standard concentrations.

Determine the percentage of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved in each interval from a linear regression analysis of the calibration curve.

Tolerances: See *Tables 1* and *2*.

Table 1. For Tablets Labeled to Contain 5 or 10 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved
4	NMT 20%
10	34.5%–59.5%
24	NLT 80%

Table 2. For Tablets Labeled to Contain 15 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved
4	NMT 20%
10	34.5%–59.5%
24	NLT 75%

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

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

Acid stage medium: Simulated gastric fluid, without enzymes, pH 1.2 ± 0.05; 250 mL (first row)

Buffer stage medium: Simulated gastric fluid, without enzymes, pH 6.8 ± 0.1; 250 mL (rows 2–4)

Apparatus 3: 25 dips/min; 20-mesh polypropylene screen on top and bottom; 30 s drip time

Times: 2 h in the *Acid stage medium* (first row); 4, 8, and 16 h (corresponding to 2, 6, and 14 h after changing the medium) in the *Buffer stage medium* (rows 2–4)

Solution A: Transfer 1 mL of triethylamine to 1000 mL of water. Adjust with phosphoric acid to a pH of 3.50 ± 0.05.

Mobile phase: Acetonitrile and *Solution A* (4:1)

Standard stock solution: 0.2 mg/mL of USP Oxybutynin Chloride RS in *Acid stage medium*

Working standard solution: Transfer 5.0 mL of the *Standard stock solution* for Tablets labeled to contain 5 mg, transfer 10 mL for Tablets labeled to contain 10 mg, or transfer 15 mL for Tablets labeled to contain 15 mg to a 100-mL volumetric flask. Dilute with *Buffer stage medium* to volume.

Sample solution: Centrifuge a portion of the solution under test at approximately 3000 rpm for 10 min. Use the supernatant.

Chromatographic system

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

Mode: LC

Detector: UV 203 nm

Column: 4.6-mm × 25-cm; packing L7

Flow rate: 1.5 mL/min

Injection volume: 25 µL

System suitability

Sample: *Working standard solution*

Suitability requirements

Tailing factor: NMT 2.0

Relative standard deviation: NMT 3.0%

Analysis

Samples: *Working standard solution* and *Sample solution*

Calculate the percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time point (C_{T2}, C_{T4}, C_{T8}, C_{T16}):

$$C_i = (r_U/r_S) \times (C_S/L) \times V \times 100$$

r_U = peak response from the *Sample solution*

r_S = peak response from the *Working standard solution*

C_S = concentration of the *Working standard solution* (mg/mL)

L = label claim (mg/Tablet)

V = volume of *Medium*, 250 mL

C_{T2} = percentage dissolved at 2 h, C_2

C_{T4} = percentage dissolved at 4 h, $C_2 + C_4$

C_{T8} = percentage dissolved at 8 h, $C_2 + C_4 + C_8$

C_{T16} = percentage dissolved at 16 h, $C_2 + C_4 + C_8 + C_{16}$

Tolerances: See *Tables 3* and *4*.

Table 3. For Tablets Labeled to Contain 5 or 10 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved
2	0%–10%
4	10%–30%
8	40%–65%
16	NLT 80%

Table 4. For Tablets Labeled to Contain 15 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved
2	0%–10%
4	10%–30%
8	35%–65%
16	NLT 75%

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 3: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 3*.
Medium: Simulated gastric fluid without enzyme; 50 mL
Apparatus 7: See *Drug Release* ⟨724⟩. Use acrylic rods. 30 dips/min, 37.0 ± 0.5°, 10 s drip time. Dip time interval: row 1, 1 h; row 2, 3 h; row 3, 6 h; row 4, 5 h; row 5, 9 h.
Times: 4, 10, and 24 h
pH 2.3 phosphate buffer: 3.4 g/L of monobasic potassium phosphate in water. Adjust with phosphoric acid or 2 N potassium hydroxide to a pH of 2.30 ± 0.05.
Standard solution: (*L*/200) mg/mL of USP Oxybutynin Chloride RS in *Medium*, where *L* is the label claim in mg/Tablet
Sample solution: Pass a portion of the solution under test through a suitable nylon filter of 0.45-µm pore size, discarding the first few mL.
Mobile phase: *pH 2.3 phosphate buffer* and acetonitrile (7:3)
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 220 nm
Column: 4.6-mm × 15-cm; packing L10
Flow rate: 1.0 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 amount, in mg, of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time interval:

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

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of the *Standard solution* (mg/mL)
L = label claim (mg/Tablet)
V = volume of *Medium*, 50 mL

Calculate the percentage of the labeled amount of oxybutynin dissolved:

$$\text{Result} = \Sigma(\text{amount dissolved at current time interval} + \text{amount dissolved at previous time intervals}) \times 100/L$$

Tolerances: See *Table 5*.

Table 5

Time (h)	Amount Dissolved
4	NMT 25%
10	40%–65%
24	NLT 75%

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 4: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 4*.
Acid stage medium: 0.1 N hydrochloric acid; 900 mL
Buffer stage medium: pH 6.0 sodium phosphate buffer with 0.2% of sodium lauryl sulfate; 900 mL
Apparatus 2: 50 rpm, with sinkers. [NOTE—A suitable sinker is available as catalog number CAPWHT-2S from www.QLA-LLC.com.]
Times: 2 h in the *Acid stage medium*; 4, 6, and 14 h (corresponding to 2, 4, 12 h after changing the medium) in the *Buffer stage medium*
Standard solution: (*L*/1000) mg/mL of USP Oxybutynin Chloride RS in *Buffer stage medium*, where *L* is the label claim, in mg/Tablet
Sample solution: Pass a portion of the solution under test through a suitable PVDF filter of 0.45-µm pore size.
pH 3.5 phosphate buffer: 6.94 g/L of monobasic potassium phosphate in water. Adjust with diluted phosphoric acid to a pH of 3.50 ± 0.05.
Mobile phase: *pH 3.5 phosphate buffer* and acetonitrile (1:1)
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 210 nm
Column: 4.6-mm × 15-cm; packing L7
Flow rate: 1.0 mL/min
Injection volume: 20 µL
System suitability
Sample: *Standard solution*
Suitability requirements
Column efficiency: NLT 2000 theoretical plates
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0%
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the concentration (C_i) in mg/mL of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) at each time point (*i*):

$$C_i = (r_U/r_S) \times C_S$$

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*

C_S = concentration of the *Standard solution* (mg/mL)

Calculate the cumulative percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved ($Q_i$) at each time point ($i$):

At $i = 1$

$$Q_1 = (C_1 \times V/L) \times 100$$

At $i = 2$ to n

$$\frac{\left(C_1 \times 900\right) + \sum_{j=2}^{n-1} C_j V_S + C_n \times \left[900 - \left(n-2\right)V_S\right] \times 100}{L}$$

i = 1, 2, ..., n
j = 2, 3, ..., n–1
C_i = concentration of oxybutynin chloride in the *Sample solution* at time point i (mg/mL)
C_j = concentration of oxybutynin chloride in the *Sample solution* at time point 2 through n–1 (mg/mL)
V_S = sampling volume (mL)
L = label claim (mg/Tablet)

Tolerances: See *Table 6*.

Table 6

Time (h)	Amount Dissolved
2	NMT 10%
4	10%–40%
6	40%–75%
14	NLT 85%

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 5: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 5*.
Medium: Acetate buffer pH 4.5, prepared as follows. Transfer 2.99 g of sodium acetate to a 1000-mL volumetric flask, dissolve in 700 mL of water, adjust with glacial acetic acid to a pH of 4.5, and dilute with water to volume; 900 mL.
Apparatus 2: 75 rpm
Times: 2, 8, 12, and 24 h
Standard stock solution: 0.28 mg/mL of USP Oxybutynin Chloride RS in acetonitrile. Use sonication, if necessary.
Standard solution: (L/900) mg/mL of USP Oxybutynin Chloride RS in *Medium*, where L is the label claim, in mg/Tablet, from the *Standard stock solution*
Sample solution: Pass a portion of the solution under test through a suitable PVDF filter of 0.45-µm pore size, discarding the first few mL of the filtrate. Replace the portion of solution withdrawn with an equal volume of *Medium*.
pH 3.5 phosphate buffer: 6.94 g/L of monobasic potassium phosphate in water. Adjust with phosphoric acid to a pH of 3.50 ± 0.05.
Mobile phase: *pH 3.5 phosphate buffer* and acetonitrile (1:1)
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 210 nm
Column: 4.6-mm × 15-cm; 5-µm packing L7
Flow rate: 1.0 mL/min
Injection volume: 20 µL
System suitability
Sample: *Standard solution*
Suitability requirements
Column efficiency: NLT 2000 theoretical plates
Tailing factor: NMT 2.0
Relative standard deviation: NMT 2.0% for six replicate injections
Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the concentration (C_i), in mg/mL, of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) in the sample withdrawn from the vessel at each point (i):

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

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of the *Standard solution* (mg/mL)

Calculate the percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time point (i):

$$\text{Result}_1 = C_1 \times V \times (1/L) \times 100$$
$$\text{Result}_2 = [(C_2 \times V) + (C_1 \times V_S)] \times (1/L) \times 100$$
$$\text{Result}_3 = \{(C_3 \times V) + [(C_2 + C_1) \times V_S]\} \times (1/L) \times 100$$
$$\text{Result}_4 = \{(C_4 \times V) + [(C_3 + C_2 + C_1) \times V_S]\} \times (1/L) \times 100$$

C_i = concentration of oxybutynin chloride in the portion of the sample withdrawn at the specified time point (mg/mL)
V = volume of *Medium*, 900 mL
L = label claim (mg/Tablet)
V_S = volume of the *Sample solution* withdrawn at each time point and replaced with *Medium* (mL)

Tolerances: See *Table 7*.

Table 7

Time (h)	Amount Dissolved
2	NMT 10%
8	30%–50%
12	55%–75%
24	NLT 85%

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 6: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 6*.
Medium: Simulated gastric fluid without enzyme; 50 mL
Apparatus 7: See *Drug Release* ⟨724⟩; each Tablet is glued to a suitable rod with water insoluble glue. At the end of each specified test interval, the systems are transferred to the next row of new tubes containing 50 mL of fresh *Medium*, 30 cycles/min; 2–3 cm amplitude.
Times: 4, 10, and 24 h

Calculate the percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved by using the following method.

Buffer: 4.83 g/L of monobasic sodium phosphate in water. Add 2.3 mL/L of triethylamine, and adjust with phosphoric acid to a pH of 2.2 ± 0.2.

Mobile phase: Acetonitrile and *Buffer* (25:75)

Diluent: To 1 L of water add phosphoric acid dropwise to a pH of 3.5 and mix well.

Standard stock solution: 0.5 mg/mL of USP Oxybutynin Chloride RS in acetonitrile

Standard solution: 0.05 mg/mL of USP Oxybutynin Chloride RS in *Diluent* from *Standard stock solution*

Sample solution: Pass a portion of the solution under test through a suitable PVDF filter of 0.45-µm pore size, discarding the first few milliliters of the filtrate. Dilute with *Diluent*, if necessary, to obtain a solution with a concentration similar to that of the *Standard solution*.

Chromatographic system
(See *Chromatography* ⟨621⟩*, System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4.6-mm × 5-cm; 5-µm packing L11
Column temperature: 35°
Flow rate: 1.5 mL/min
Injection volume: 50 µL

System suitability
Sample: *Standard solution*
Suitability requirements
Tailing factor: 0.5–2.5
Relative standard deviation: NMT 2.0%

Analysis
Samples: *Standard solution* and *Sample solution*
Calculate the concentration (C_i), in mg/mL, of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) in the sample withdrawn from the vessel at each time point (*i*) shown in *Table 8*:

$$C_i = (r_U/r_S) \times C_S$$

r_U = peak response of oxybutynin from the *Sample solution*
r_S = peak response of oxybutynin from the *Standard solution*
C_S = concentration of USP Oxybutynin Chloride RS in the *Standard solution* (mg/mL)

Calculate the percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time point shown in *Table 8*:

$$\text{Result}_1 = C_1 \times V \times D \times (1/L) \times 100$$
$$\text{Result}_2 = (C_2 + C_1) \times V \times D \times (1/L) \times 100$$
$$\text{Result}_3 = (C_1 + C_2 + C_3) \times V \times D \times (1/L) \times 100$$

C_i = concentration of oxybutynin chloride in the portion of sample withdrawn at time point *i* (mg/mL)
V = volume of *Medium*, 50 mL
D = dilution factor for the *Sample solution*
L = label claim (mg/Tablet)

Tolerances: See *Table 8*.

Table 8

Time (h)	Amount Dissolved (%)
4	NMT 20
10	35–60
24	NLT 80

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 7: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 7*.

Acid stage medium: 0.1 N hydrochloric acid; 900 mL

Buffer stage medium: pH 6.0 sodium phosphate buffer with 0.2% of sodium lauryl sulfate; 900 mL

Apparatus 2: 50 rpm, with sinkers. [NOTE—A suitable sinker is available as catalog number CAPWHT-2S from www.QLA-LLC.com.]

Times: 2 h in the *Acid stage medium*; 4, 8, and 16 h (corresponding to 2, 6, 14 h after changing the medium) in the *Buffer stage medium* for 5 mg Tablets and 6, 10, 16 h (corresponding to 4, 8, 14 h after changing the medium) in the *Buffer stage medium* for 10 mg and 15 mg Tablets.

Procedure: After 2 h in the *Acid stage medium*, withdraw a sample from the solution, and filter. Replace the *Acid stage medium* with the *Buffer stage medium*, and run the test for the times specified.

Buffer: 6.94 g/L of monobasic potassium phosphate in water. Adjust with diluted phosphoric acid to a pH of 3.50 ± 0.05.

Mobile phase: Acetonitrile and *Buffer* (1:1)

Standard solution: 0.01 mg/mL of USP Oxybutynin Chloride RS in *Buffer stage medium*

Sample solution: Pass a portion of the solution under test through a suitable PVDF filter of 0.45-µm pore size.

Chromatographic system
(See *Chromatography* ⟨621⟩*, System Suitability*.)
Mode: LC
Detector: UV 210 nm
Column: 4.6-mm × 15-cm; 5-µm packing L7
Flow rate: 1.0 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 oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved in the *Acid stage medium*:

$$\text{Result} = (r_U/r_S) \times C_S \times V \times (1/L) \times 100$$

r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Oxybutynin Chloride RS in the *Standard solution* (mg/mL)
V = volume of the *Acid stage medium*, 900 mL
L = label claim (mg/Tablet)

Calculate the concentration (C_i) of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) in the sample withdrawn from the vessel at each time point *i* during the buffer stage:

$$C_i = (r_i/r_S) \times C_S$$

r_i = peak response from the *Sample solution* at time point *i*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Oxybutynin Chloride RS in the *Standard solution* (mg/mL)

Calculate the percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time point *i* during the buffer stage:

$$\text{Result}_1 = C_1 \times V \times (1/L) \times 100$$
$$\text{Result}_2 = \{[C_2 \times (V - V_S)] + (C_1 \times V_S)\} \times (1/L) \times 100$$
$$\text{Result}_3 = (\{C_3 \times [V - (2 \times V_S)]\} + [(C_2 + C_1) \times V_S]) \times (1/L) \times 100$$

C_i = concentration of oxybutynin chloride in the *Sample solution* withdrawn at time point *i* (mg/mL)
V = volume of the *Buffer stage medium*, 900 mL
L = label claim (mg/Tablet)
V_S = volume of the *Sample solution* withdrawn at each time point *i* during the buffer stage (mL)

Tolerances: See *Tables 9* and *10*.

Table 9. For Tablets Labeled to Contain 5 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved (%)
2	NMT 10
4	15–35
8	40–70
16	NLT 70

Table 10. For Tablets Labeled to Contain 10 and 15 mg of Oxybutynin Chloride

Time (h)	Amount Dissolved (%)
2	NMT 10
6	35–60
10	60–85
16	NLT 80

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

Test 8: If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 8*.
Acid stage medium: Simulated gastric fluid, without enzymes, pH 1.2; 250 mL (first row)
Buffer stage medium: Simulated intestinal fluid, without enzymes, pH 6.8; 250 mL (rows 2–4)
Apparatus 3: 25 dips/min; 20-mesh polypropylene screen on top and bottom; 30 s drip time
Times: 2 h in the *Acid stage medium* (first row); 4, 8, and 16 h (corresponding to 2, 6, and 14 h after changing the medium) in the *Buffer stage medium* (rows 2–4)
Buffer: 4.83 g/L of monobasic sodium phosphate in water. Add 2.3 mL/L of triethylamine, and adjust with diluted phosphoric acid to a pH of 4.0.
Mobile phase: Acetonitrile and *Buffer* (35:65)
Standard stock solution: 0.2 mg/mL of USP Oxybutynin Chloride RS in *Acid stage medium*
Standard solution: Transfer volume of the *Standard stock solution* specified in *Table 11* to a 100-mL volumetric flask and dilute with *Buffer stage medium* to volume.

Table 11

Tablet Strength (mg)	Volume of Standard stock solution (mL)	Final Volume (mL)
5	5.0	100.0
10	10.0	100.0
15	15.0	100.0

Sample solution: Pass a portion of the solution under test through a suitable PVDF filter of 0.45-µm pore size, discarding the first few milliliters.
Chromatographic system
(See *Chromatography* ⟨621⟩, *System Suitability*.)
Mode: LC
Detector: UV 230 nm
Column: 4.6-mm × 5-cm; 5-µm packing L7
Column temperature: 35°
Flow rate: 1.5 mL/min
Injection volume: 50 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 total percentage of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at each time point (C_{T2}, C_{T4}, C_{T8}, C_{T16}):

$$C_i = (r_U/r_S) \times (C_S/L) \times V \times 100$$

C_i = percentage of oxybutynin chloride in the *Sample solution* withdrawn at time point *i*
r_U = peak response from the *Sample solution*
r_S = peak response from the *Standard solution*
C_S = concentration of USP Oxybutynin Chloride RS in the *Standard solution* (mg/mL)
L = label claim (mg/Tablet)
V = volume of *Medium*, 250 mL
C_{T2} = percentage dissolved at 2 h, C_{T2}
C_{T4} = percentage dissolved at 4 h, $C_{T2} + C_{T4}$
C_{T8} = percentage dissolved at 8 h, $C_{T2} + C_{T4} + C_{T8}$
C_{T16} = percentage dissolved at 16 h, $C_{T2} + C_{T4} + C_{T8} + C_{T16}$

Tolerances: See *Table 12*.

Table 12

Time (h)	Amount Dissolved (%)
2	NMT 10
4	5–25
8	34–59
16	NLT 80

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.

▲**Test 9:** If the product complies with this test, the labeling indicates that the product meets USP *Dissolution Test 9*. **Acid stage medium, Buffer stage medium, Apparatus 3, Times, Solution A, Mobile phase, Standard stock solution, Working standard solution, Sample solution, Chromatographic system, System suitability,** and **Analysis:** Proceed as directed in *Test 2*. **Tolerances:** See *Table 13*.

Table 13

Time (h)	Amount Dissolved (%)
2	0–10
4	10–30
8	46–66
16	NLT 80

The percentages of the labeled amount of oxybutynin chloride ($C_{22}H_{31}NO_3 \cdot HCl$) dissolved at the times specified conform to *Dissolution* ⟨711⟩, *Acceptance Table 2*.▲ (RB 1-Oct-2019)

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

IMPURITIES

Change to read:

- **ORGANIC IMPURITIES**

Diluent, Solution A ▲**(if *Assay, Procedure 1* is used)**,▲ (RB 1-Oct-2019)**Mobile phase, Impurity stock solution, System suitability solution, Sample solution, Chromatographic system,** and **System suitability:** Proceed as directed in the ▲corresponding▲ (RB 1-Oct-2019) *Assay* procedure.

Impurity standard solution: 1 µg/mL of USP Oxybutynin Related Compound A RS in ▲the corresponding ▲ (RB 1-Oct-2019) *Diluent* from the ▲corresponding▲ (RB 1-Oct-2019) *Impurity stock solution*

Analysis

Samples: *Impurity standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Tablets taken:

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

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

r_S = peak response from the *Impurity standard solution*

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

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

[NOTE—Disregard any peak less than 0.1%.]

Acceptance criteria

Individual impurities: NMT 1% of oxybutynin related compound A is found.

Total impurities: NMT 2%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in tight 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.
- **USP REFERENCE STANDARDS** ⟨11⟩

USP Oxybutynin Chloride RS

USP Oxybutynin Related Compound A RS

Phenylcyclohexylglycolic acid.

$C_{14}H_{18}O_3$ 234.30