Alfuzosin Hydrochloride Extended Release Tablets

<table>
<thead>
<tr>
<th>Type of Posting</th>
<th>Revision Bulletin</th>
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<tr>
<td>Posting Date</td>
<td>27–May–2016</td>
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<td>Official Date</td>
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<td>Expert Committee</td>
<td>Chemical Medicines Monographs 5</td>
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<td>Compliance</td>
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</tbody>
</table>

In accordance with the Rules and Procedures of the 2015-2020 Council of Experts, the Chemical Medicines Monographs 5 Expert Committee has revised the Alfuzosin Hydrochloride Extended-Release Tablets monograph. The purpose for the revision is to add a dissolution test for a generic product approved by the FDA. The liquid chromatographic procedure in Dissolution Test 7 is based on analyses performed with an Inertsil C8-3 brand of L7 column. The typical retention time for alfuzosin is about 2.6 min.

The Alfuzosin Hydrochloride Extended Release Tablets Revision Bulletin supersedes the current official monograph. The Revision Bulletin will be incorporated into USP 40–NF 35.

Should you have any questions, please contact Mary P. Koleck, Ph.D., Scientific Liaison (301-230-7420 or mpk@usp.org).
Alfuzosin Hydrochloride Extended-Release Tablets

DEFINITION
Alfuzosin Hydrochloride Extended-Release Tablets contain NLT 90.0% and NMT 110.0% of the labeled amount of alfuzosin hydrochloride (C19H27N5O4·HCl).

IDENTIFICATION

- **A. INFRARED ABSORPTION (197):** [NOTE—Methods described in (197K) or (197A) may be used.]
  
  **Sample:** Grind 4 Tablets, and add 20 mL of water. [NOTE—When analyzing multi-layer Tablets, isolate the layer containing alfuzosin hydrochloride using a suitable tool.] Add 20 mL of strong ammonia solution. Extract with 20 mL of methylene chloride, and separate the organic layer. Repeat the extraction successively with 20 mL, then with 10 mL of methylene chloride. Wash the combined organic layers with 20 mL of water. Dry the organic solution using a phase separation filter. Take 2.0 mL of the dried organic solution, and mix with 200 mg of finely ground potassium bromide. Evaporate the methylene chloride at 60°C, then at 105°C for 30 min. Make a disk. Alternatively, evaporate methylene chloride from the dried organic solution at 60°C, then at 105°C for 30 min. Perform the IR spectrum.

  **Acceptance criteria:** The maxima of the spectrum obtained from the **Sample** correspond in position and relative intensity to those obtained from USP Alfuzosin Hydrochloride RS, treated in the same manner as the **Sample**, beginning with “add 20 mL of water.”

- **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

**A. PREPARATION**

- **Solution A:** 5.0 mL of perchloric acid in 900 mL of water. Adjust with 2 M sodium hydroxide to a pH of 3.5, and dilute with water to 1000 mL.

- **Mobile phase:** Acetonitrile, tetrahydrofuran, and **Solution A** (20:1:80).

- **Diluent:** 0.01 N hydrochloric acid

**Standard stock solution:** 0.15 mg/mL of USP Alfuzosin Hydrochloride RS in methanol

**Standard solution:** 0.03 mg/mL of USP Alfuzosin Hydrochloride RS in **Diluent** from the **Standard stock solution**

**Sample stock solution:** Place a suitable number of Tablets into a suitable volumetric flask to obtain a solution having a concentration of 0.16 mg/mL of alfuzosin hydrochloride. Add 80% of the flask volume of methanol, and stir for at least 1 h using a magnetic stirrer. Add 10% of the flask volume of **Diluent**, mix, and allow it to cool to room temperature. Dilute the resulting suspension with methanol to volume, stir, and allow to settle for 30 min.

**Sample solution:** 0.03 mg/mL of alfuzosin hydrochloride in **Diluent** from the **Sample stock solution** supernatant. Pass through a suitable filter.

**Chromatographic system**

(See Chromatography (621), System Suitability.)

**PERFORMANCE TESTS**

**Change to read:**

- **DISSOLUTION (711)**

  **Test 1**

  Medium: 0.01 N hydrochloric acid; 500 mL

  **Apparatus 2:** 100 rpm, with Tablet holder (see Figure 1)

Figure 1. 37.5-mm (l) × 20-mm (d) stainless steel cylinders are used as sample holders. The cylinders contain screw caps drilled with seven 4.5-mm holes. Seven 4.5-mm holes are drilled in the bottom, and 12 longitudinal series of five 5-mm holes are drilled on the cylinders, alternatively starting and ending with one 1.7-mm hole.

**Times:** 1, 6, 12, and 20 h

**Sample solution:** Pass a portion of the solution under test through a suitable filter.

**Standard solution:** (L/500) mg/mL of USP Alfuzosin Hydrochloride RS in **Medium**, where L is the Tablet label claim in mg
Detector: UV 330 nm
Blank: Medium
Path length: 1 cm

Tolerances: See Table 1.

Table 1

<table>
<thead>
<tr>
<th>Level</th>
<th>Time (b)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Each Tablet:</td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td>1</td>
<td>10–20</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>20–50</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>40–55</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>65–85</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>80–90</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>NLT 85</td>
</tr>
<tr>
<td>L2</td>
<td>1</td>
<td>9–22</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>36–61</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>59–94</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>NLT 77</td>
</tr>
<tr>
<td>L3</td>
<td>1</td>
<td>8–24</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>32–66</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>52–102</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>NLT 68</td>
</tr>
</tbody>
</table>

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

Medium: 0.01 N hydrochloric acid; 900 mL
Apparatus 2: 100 rpm
Times: 1, 3, 12, and 24 h
Buffer: Dilute 5.0 mL of perchloric acid in 900 mL of water, adjust with diluted sodium hydroxide (0.1 g/mL) to a pH of 3.5 ± 0.5, and dilute with water to 1 L.
Mobile phase: Acetonitrile and Buffer (25:75)
Standard stock solution: 0.28 mg/mL of USP Alfuzosin Hydrochloride RS, prepared as follows. In a 200-mL volumetric flask dissolve 55.5 mg of USP Alfuzosin Hydrochloride RS in 5 mL of methanol, sonicate to dissolve, and dilute with Medium to volume.
Standard solution: 0.011 mg/mL of USP Alfuzosin Hydrochloride RS in Medium from the Standard stock solution
Sample solution: Pass a portion of the solution under test through a suitable filter. Replace the portion of solution withdrawn with an equal volume of Medium.

Chromatographic system
(See Chromatography (621), System Suitability.)

Mode: LC
Detector: UV 244 nm
Column: 4.6-mm × 15-cm; 5-µm packing L7
Column temperature: 30°
Flow rate: 1.2 mL/min
Injection volume: 20 µL

System suitability
Sample: Standard solution
Suitability requirements
Tailing factor: NMT 2.0
Column efficiency: NLT 3000 theoretical plates
Relative standard deviation: NMT 2.0%

Analysis
Samples: Standard solution and Sample solution
Calculate the concentration (C) of alfuzosin hydrochloride (C19H27N5O4 · HCl) in the sample withdrawn from the vessel at each time point (t):

\[ \text{Result}_1 = \left( \frac{r_U}{r_S} \right) \times C_S \]

\[ r_U = \text{peak response from the Sample solution} \]
\[ r_S = \text{peak response from the Standard solution} \]

Average of 24 Tablets complies with

\[ C_S = \text{concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)} \]

Calculate the percentage of the labeled amount of alfuzosin hydrochloride (C19H27N5O4 · HCl) dissolved at each time point (t):

\[ \text{Result}_2 = \left[ (C_2 \times V) + (C_1 \times V_S) \right] \times (1/L) \times 100 \]

\[ \text{Result}_3 = \left[ (C_1 \times V) + (C_2 + C_3) \times V_3 \right] \times (1/L) \times 100 \]

\[ \text{Result}_4 = \left[ (C_3 \times V) + (C_2 + C_3 + C_4) \times V_4 \right] \times (1/L) \times 100 \]

\[ r_U = \text{peak response from the Sample solution} \]
\[ r_S = \text{peak response from the Standard solution} \]

\[ C_S = \text{concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)} \]
\[ V = \text{volume of Medium, 900 mL} \]
\[ L = \text{label claim (mg/Tablet)} \]
\[ V_S = \text{volume of the Sample solution withdrawn at each time point and replaced with Medium (mL)} \]

Tolerances: See Table 2.

Table 2

<table>
<thead>
<tr>
<th>Time Point (h)</th>
<th>Time (b)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>NMT 20</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>15–35</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>50–70</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>NLT 80</td>
</tr>
</tbody>
</table>

The percentages of the labeled amount of alfuzosin hydrochloride 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 it meets USP Dissolution Test 3.
Medium: 0.25% sodium dodecyl sulfate in 0.05 M sodium phosphate buffer, pH 6.8 (2.5 g/L of sodium dodecyl sulfate, 6.9 g/L of monobasic sodium phosphate monohydrate, and 0.83 g/L of sodium hydroxide in water previously degassed with helium. Adjust with either phosphoric acid or 1 N sodium hydroxide to a pH of 6.8 ± 0.05 ); 900 mL.
Apparatus 1:  100 rpm
  Times:  1, 6, 12, and 24 h
Standard stock solution:  1.1 mg/mL of USP Alfuzosin Hydrochloride RS in methanol
Standard solution:  0.011 mg/mL of USP Alfuzosin Hydrochloride RS in Medium from the Standard stock solution
Sample solution:  Pass a portion of the solution under test through a suitable filter.

Instrumental conditions
(See *Ultraviolet-Visible Spectroscopy (857).* (CN 1-May-2016))

Mode:  UV-Vis
Analytical wavelength:  331 nm, background correction at 490 nm
Blank:  Medium
Cell:  1.0 cm

Analysis
Samples:  Standard solution and Sample solution
Calculate the percentage of the labeled amount of alfuzosin hydrochloride (C_{19}H_{27}N_{5}O_{4} · HCl) dissolved at each time point (t):

\[
\text{Result} = \left( \frac{A_U}{A_S} \right) \times C_S \times V \times (1/L) \times 100
\]

\(A_U\) = absorbance of the Sample solution
\(A_S\) = absorbance of the Standard solution
\(C_S\) = concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)

\(V\) = volume of Medium, 900 mL

\(L\) = label claim (mg/Tablet)

Tolerances:  See Table 3.

### Table 3

<table>
<thead>
<tr>
<th>Time Point (t)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
</tr>
</tbody>
</table>

The percentages of the labeled amount of alfuzosin hydrochloride 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 it meets USP Dissolution Test 4.

Medium:  0.01 N hydrochloric acid; 900 mL
Apparatus 2:  100 rpm
Times:  1, 6, 12, and 20 h
Standard solution:  0.01 mg/mL of USP Alfuzosin Hydrochloride RS in Medium
Sample solution:  Centrifuge a portion of the solution under test.

Instrumental conditions
(See *Ultraviolet-Visible Spectroscopy (857).* (CN 1-May-2016))

Mode:  UV
Analytical wavelength:  245 nm
Blank:  Medium
Path length:  0.2 cm

Analysis
Samples:  Standard solution and Sample solution
Calculate the concentration (\(C_i\)) of alfuzosin hydrochloride (C_{19}H_{27}N_{5}O_{4} · HCl) in the sample withdrawn from the vessel at each time point (i):

\[
\text{Result}_i = \left( \frac{C_i}{C_S} \right) \times (1/t)
\]

\(C_i\) = concentration of alfuzosin hydrochloride in the portion of sample withdrawn at the specified time point (mg/mL)

\(C_S\) = concentration of alfuzosin hydrochloride in the Standard solution (mg/mL)

\(t\) = time point (h)

Tolerances:  See Table 4.

### Table 4

<table>
<thead>
<tr>
<th>Time Point (t)</th>
<th>Time (h)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>NMT 30</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>40-60</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>65-85</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>NLT 80</td>
</tr>
</tbody>
</table>

The percentages of the labeled amount of alfuzosin hydrochloride 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 it meets USP Dissolution Test 5.

Medium:  0.01 N hydrochloric acid; 900 mL
Apparatus 2:  100 rpm
Times:  1, 3, 6, 12, and 20 h
Buffer:  Add 1 mL of triethylamine in 1000 mL of water. Adjust with phosphoric acid to a pH of 2.5 ± 0.05. Pass through a suitable filter of 0.45-µm pore size.

Mobile phase:  Methanol and Buffer (40:60)
Standard stock solution:  0.55 mg/mL of USP Alfuzosin Hydrochloride RS. Prepare by transferring a portion of USP Alfuzosin Hydrochloride RS to a suitable flask. Add methanol to 20% of the flask volume, and sonicate at room temperature to dissolve. Dilute with Medium to volume.

Standard solution:  0.011 mg/mL of USP Alfuzosin Hydrochloride RS in Medium from the Standard stock solution. Pass through a suitable filter of 0.45-µm pore size.

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

Chromatographic system
(See Chromatography (621), System Suitability.)
Alfuzosin

**Mode:** LC  
**Detector:** UV 245 nm  
**Column:** 4.6-mm x 15-cm; 5-µm packing L1  
**Flow rate:** 1 mL/min  
**Injection volume:** 10 µL  
**System suitability**  
**Sample:** Standard solution  
**Suitability requirements**  
**Tailing factor:** NMT 2.0  
**Column efficiency:** NLT 2000 theoretical plates  
**Relative standard deviation:** NMT 2.0%  
**Analysis**  
**Samples:** Standard solution and Sample solution  
Calculate the concentration (C) of alfuzosin hydrochloride (C19H27N5O4·HCl) in the sample withdrawn from the vessel at each time point (t):

\[
\text{Result}_i = \left( \frac{r_i}{r_0} \right) \times C_i
\]

- \( r_0 \) = peak response from the Sample solution  
- \( r_i \) = peak response from the Standard solution  
- \( C_i \) = concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)

Calculate the percentage of the labeled amount of alfuzosin hydrochloride (C19H27N5O4·HCl) dissolved at each time point (t):

\[
\text{Result}_1 = C_i \times V \times (1/L) \times 100
\]

\[
\text{Result}_2 = \left( \left( C_2 \times (V - V_3) \right) + (C_i \times V_3) \right) \times (1/L) \times 100
\]

\[
\text{Result}_3 = \left( \left( C_3 \times (V - (2 \times V_3)) \right) + \left( C_2 + C_i \right) \times V_3 \right) \times (1/L) \times 100
\]

\[
\text{Result}_4 = \left( \left( C_4 \times (V - (3 \times V_3)) \right) + \left( C_3 + C_2 + C_1 \right) \times V_3 \right) \times (1/L) \times 100
\]

\[
\text{Result}_5 = \left( \left( C_5 \times (V - (4 \times V_3)) \right) + \left( C_4 + C_3 + C_2 \right) \times V_3 \right) \times (1/L) \times 100
\]

- \( C_i \) = concentration of alfuzosin hydrochloride in the portion of 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 (mL)

**Tolerances:** See Table 5.

<table>
<thead>
<tr>
<th>Time Point (h)</th>
<th>Time (b)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>NMT 20</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>20-40</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>35-55</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>60-80</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>NLT 80</td>
</tr>
</tbody>
</table>

The percentages of the labeled amount of alfuzosin hydrochloride 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 it meets USP Dissolution Test 6.

**Medium:** 0.01 N hydrochloric acid; 900 mL  
**Apparatus 2:** 100 rpm. Adjust the paddle height to 4.5 cm above the bottom of the vessel and use a 10# mesh basket as sinker.  
**Times:** 1, 6, 12, and 20 h  
**Buffer:** 2.3 g/L of anhydrous dibasic sodium phosphate and 7.75 g/L of monobasic potassium phosphate  
**Mobile phase:** Acetonitrile and Buffer (50:50)  
**Standard stock solution:** 0.45 mg/mL of USP Alfuzosin Hydrochloride RS. Prepare by transferring a portion of USP Alfuzosin Hydrochloride RS to a suitable flask. Add 20% of the flask volume of water. Sonicate to dissolve, and dilute with Medium to volume.  
**Standard solution:** 0.011 mg/mL of USP Alfuzosin Hydrochloride RS in Medium from the Standard stock solution  
**Sample solution:** Pass a portion of the solution under test through a suitable filter. Replace with the same volume of Medium.

**Chromatographic system**  
(See Chromatography (621), System Suitability.)  
**Mode:** LC  
**Detector:** UV 245 nm  
**Column:** 4.6-mm x 25-cm; 5-µm packing L1  
**Column temperature:** 30°  
**Flow rate:** 1 mL/min  
**Injection volume:** 20 µL  
**System suitability**  
**Sample:** Standard solution  
**Suitability requirements**  
**Tailing factor:** NMT 2.0  
**Column efficiency:** NLT 3500 theoretical plates  
**Relative standard deviation:** NMT 2.0%  
**Analysis**  
**Samples:** Standard solution and Sample solution  
Calculate the concentration (C) of alfuzosin hydrochloride (C19H27N5O4·HCl) in the sample withdrawn from the vessel at each time point (t):

\[
\text{Result}_1 = \left( \frac{r_i}{r_0} \right) \times C_i
\]

- \( r_0 \) = peak response from the Sample solution  
- \( r_i \) = peak response from the Standard solution  
- \( C_i \) = concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)

Calculate the percentage of the labeled amount of alfuzosin hydrochloride (C19H27N5O4·HCl) dissolved at each time point (t):

\[
\text{Result}_1 = C_i \times V \times (1/L) \times 100
\]

\[
\text{Result}_2 = \left( \left( C_2 \times (V - V_3) \right) + (C_i \times V_3) \right) \times (1/L) \times 100
\]

\[
\text{Result}_3 = \left( \left( C_3 \times (V - (2 \times V_3)) \right) + \left( C_2 + C_i \right) \times V_3 \right) \times (1/L) \times 100
\]

\[
\text{Result}_4 = \left( \left( C_4 \times (V - (3 \times V_3)) \right) + \left( C_3 + C_2 + C_1 \right) \times V_3 \right) \times (1/L) \times 100
\]

\[
\text{Result}_5 = \left( \left( C_5 \times (V - (4 \times V_3)) \right) + \left( C_4 + C_3 + C_2 \right) \times V_3 \right) \times (1/L) \times 100
\]

- \( C_i \) = concentration of alfuzosin hydrochloride in the portion of 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 (mL)

**Tolerances:** See Table 6.
The percentages of the labeled amount of alfuzosin hydrochloride 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 it meets USP Dissolution Test 7.

**Apparatus 2:** 100 rpm with sinker; see Dissolution (711), Figure 2a.

**Solution A:** 500 g/L of sodium hydroxide

**Solution B:** 100 g/L of sodium hydroxide

**Buffer:** Add 5 mL of perchloric acid in 1000 mL of water. Adjust with 0.01 N hydrochloric acid; 900 mL 2 6 40±60. 1 1 NMT 25.

**Dissolution Test 7** labeling indicates that it meets USP acceptance Table 2.

**Standard solution:** 0.01 mg/mL of USP Alfuzosin Hydrochloride RS in Medium.

**Sample solution:** Centrifuge or pass a portion of the solution under test through a suitable filter of 0.45-µm pore size.

**Chromatographic system**

(See Chromatography (621), System Suitability.)

**Mode:** LC

**Detector:** UV 245 nm

**Column:** 4.6-mm × 5-cm; 3-µm packing L7

**Flow rate:** 1.5 mL/min

**Injection volume:** 10 µL

**Run time:** NLT 1.5 times the retention time of alfuzosin

**System suitability**

**Sample:** Standard solution

**Suitability requirements**

**Tailing factor:** NMT 1.8

**Relative standard deviation:** NMT 2.0%

**Analysis**

**Samples:** Standard solution and Sample solution

Calculate the concentration (C) of alfuzosin hydrochloride (C19H27N5O4 · HCl) in the sample withdrawn from the vessel at each time point (i):

\[
\text{Result}_i = (r_i/r_s) \times C_S
\]

\[\begin{align*}
\text{peak response from the Sample solution} = r_i \\
\text{peak response from the Standard solution} = r_s \\
\text{concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)} = C_S
\end{align*}\]

Calculate the percentage of the labeled amount of alfuzosin hydrochloride (C19H27N5O4 · HCl) dissolved at each time point (i):

\[
\text{Result}_i = \frac{C_i \times V \times (1/L) \times 100}{V_i}
\]

Table 6

<table>
<thead>
<tr>
<th>Time Point (i)</th>
<th>Time (h)</th>
<th>Amount Dissolved (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>NMT 30</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>45-65</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>70-90</td>
</tr>
<tr>
<td>4</td>
<td>20</td>
<td>NLT 85</td>
</tr>
</tbody>
</table>

**Tolerances:** See Table 7.

The percentages of the labeled amount of alfuzosin hydrochloride dissolved at the times specified conform to Dissolution (711), Acceptance Table 2.

**Uniformity of dosage units (905):** Meet the requirements.

**Impurities**

**Organic impurities**

**Solution A, Mobile phase, Diluent, Sample solution, and Chromatographic system:** Proceed as directed in the Assay.

**System suitability stock solution:** 0.4 mg/mL of USP Alfuzosin System Suitability Mixture A RS in methanol

**System suitability solution:** 0.03 mg/mL of USP Alfuzosin System Suitability Mixture A RS in Diluent from the System suitability stock solution

**Standard stock solution:** 0.15 mg/mL of USP Alfuzosin Hydrochloride RS in methanol

**Standard solution:** 0.03 mg/mL of USP Alfuzosin Hydrochloride RS in Diluent from the Standard stock solution

**System suitability**

**Samples:** System suitability solution and Standard solution

**Suitability requirements**

**Resolution:** NLT 1.0 between alfuzosin and the furamide analog; NLT 1.0 between decacylated alfuzosin and the N-formyl analog, System suitability solution

**Relative standard deviation:** NMT 2.0%, Standard solution

**Analysis**

**Samples:** Standard solution and Sample solution

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

\[
\text{Result} = \frac{(r_i/r_s) \times (C_i/C_S) \times 100}{V_s}
\]

\[\begin{align*}
\text{peak response of each impurity from the Sample solution} = r_i \\
\text{peak response of alfuzosin from the Sample solution} = r_s \\
\text{concentration of USP Alfuzosin Hydrochloride RS in the Standard solution (mg/mL)} = C_S \\
\text{nominal concentration of alfuzosin hydrochloride in the Sample solution (mg/mL)} = C_U
\end{align*}\]
Acceptance criteria: See Table 8.

### Table 8

<table>
<thead>
<tr>
<th>Name</th>
<th>Relative Retention Time</th>
<th>Acceptance Criteria, NMT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deacylated alfuzosin*</td>
<td>0.46</td>
<td>0.40</td>
</tr>
<tr>
<td>N-Formyl analog*</td>
<td>0.50</td>
<td>0.30</td>
</tr>
<tr>
<td>Alfuzosin</td>
<td>1.0</td>
<td>N</td>
</tr>
<tr>
<td>Furamide analog*</td>
<td>1.18</td>
<td>N</td>
</tr>
<tr>
<td>Any individual unspecified impurity</td>
<td>—</td>
<td>0.20</td>
</tr>
<tr>
<td>Total impurities</td>
<td>—</td>
<td>0.80</td>
</tr>
</tbody>
</table>

* N²-(3-Aminopropyl)-6,7-dimethoxy-N°-methylquinazoline-2,4-diamine.
* N-[3-[(4-Amino-6,7-dimethoxyquinazolin-2-yl)(methyl)amino]propyl]formamide.
* N-[3-[(4-Amino-6,7-dimethoxyquinazolin-2-yl)(methyl)amino]propyl]furan-2-carboxamide.
* Furamide analog, a component of USP Alfuzosin System Suitability Mixture A RS, is not a specified impurity.

### ADDITIONAL REQUIREMENTS

- **Packaging and Storage:** Protect from light and moisture. 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 Alfuzosin Hydrochloride RS
  - USP Alfuzosin System Suitability Mixture A RS

  
  $$C_{13}H_{21}N_5O_4 \quad 385.42$$

  Deacylated alfuzosin: N²-(3-Aminopropyl)-6,7-dimethoxy-N°-methylquinazoline-2,4-diamine.
  
  $$C_{16}H_{21}N_5O_2 \quad 291.35$$

  N-Formyl analog: N-[3-[(4-Amino-6,7-dimethoxyquinazolin-2-yl)(methyl)amino]propyl]formamide.
  
  $$C_{15}H_{21}N_5O_3 \quad 319.36$$

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