Ofloxacin Eye Drops

Details for the public consultation of this monograph are as follows:

<table>
<thead>
<tr>
<th>EAG ABS</th>
<th>Antibiotics</th>
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<tbody>
<tr>
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<tr>
<td>Deadline for Comment</td>
<td>31st December 2020</td>
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<td>Target Publication (subject to change)</td>
<td>BP 2023</td>
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<tr>
<td>Notes:</td>
<td>NEW Monograph prepared by correspondence with manufacturers. If limits are too restrictive, please provide batch/stability data to demonstrate that an increase is required.</td>
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**Action and use**

Fluoroquinolone antibacterial

**DEFINITION**

Ofloxacin Eye Drops are a sterile solution of Ofloxacin in a suitable vehicle.

The eye drops comply with the requirements stated under Eye Preparations and with the following requirements.

**Content of ofloxacin, C₁₈H₂₀FN₃O₄**

93.0 to 107.0% of the stated amount.

**IDENTIFICATION**

Shake a volume of the eye drops containing 0.1g Ofloxacin with an equal volume of dichloromethane. Evaporate the bottom layer to dryness. The infrared absorption spectrum of the residue, Appendix II A, is concordant with the reference spectrum of Ofloxacin (RS XXX).

**TESTS**

**Acidity**

pH of a 3 mg/ml solution, 6.0 to 6.7, Appendix V L.

**Related substances**
Carry out the method for liquid chromatography, Appendix III D, using the following solutions in a mixture of 14 volumes of acetonitrile and 86 volumes of solution A as the diluent.

**Solution A:** 3.08 g/L of ammonium acetate and 5.38 g/L of sodium perchlorate, adjusted to pH 2.2 using orthophosphoric acid.

1. Dilute a suitable volume of the eye drops with the diluent to form a solution containing 0.04% w/v Ofloxacin.
2. Dilute 1 volume of solution (1) to 200 volumes.
3. 0.00008% w/v each of ofloxacin impurity D EPCRS and ofloxacin impurity E EPCRS and 0.0002% w/v of ofloxacin BPCRS.
4. Dilute 1 volume of solution (2) to 5 volumes.

**CHROMATOGRAPHIC CONDITIONS**

(a) Use a stainless steel column (15 cm × 4.6 mm) packed with end-capped octadecysilyl silica gel for chromatography (3 µm) (YMC Pack Pro C18 is suitable).
(b) Use gradient elution and the mobile phase described below.
(c) Use a flow rate of 1.0 mL per minute.
(d) Use a column temperature of 38°.
(e) Use a detection wavelength of 294 nm.
(f) Inject 10 µL of each solution.

**MOBILE PHASE**

*Mobile phase A* 16 volumes of acetonitrile and 84 volumes of solution A.

*Mobile phase B* 20 volumes of methanol, 30 volumes of acetonitrile and 50 volumes of solution A.

<table>
<thead>
<tr>
<th>Time (Minutes)</th>
<th>Mobile phase A (% v/v)</th>
<th>Mobile phase B (% v/v)</th>
<th>Comment</th>
</tr>
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<tbody>
<tr>
<td>0-5</td>
<td>100</td>
<td>0</td>
<td>isocratic</td>
</tr>
<tr>
<td>5-10</td>
<td>100→82</td>
<td>0→18</td>
<td>linear gradient</td>
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<td>10-15</td>
<td>82→40</td>
<td>18→60</td>
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<tr>
<td>30-32</td>
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<tr>
<td>32-40</td>
<td>100</td>
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<td>re-equilibration</td>
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</table>

When the chromatograms are recorded under the prescribed conditions, the relative retention(s) with reference to Ofloxacin (retention time about 10 minutes) are: impurity D, about 0.7; impurity E, about 0.9 and impurity A, about 2.8.

**SYSTEM SUITABILITY**

The test is not valid unless:

in the chromatogram obtained with solution (3), the resolution between impurity E and ofloxacin is at least 2.0 and;

in the chromatogram obtained with solution (4), the signal-to-noise ratio of the peak due to ofloxacin is not less than 45.

**LIMITS**
Identify any peak corresponding to impurity D in the chromatogram obtained with solution (1), using the chromatogram obtained with solution (3), and multiply the area of this peak by a correction factor of 4.5.

In the chromatogram obtained with solution (1):

the area of no more than 1 secondary peak is not greater than 1.6 times the area of the principal peak in the chromatogram obtained with solution (2) (0.8%);

the area of any peak corresponding to impurity D is not greater than twice the area of the principal peak in the chromatogram obtained with solution (4) (0.2%);

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

the sum of the areas of any secondary peaks is not greater than the area of the principal peak in the chromatogram obtained with solution (2) (1.0%).

Disregard any peak with an area less than the area of the principal peak in the chromatogram obtained with solution (4) (0.1%).

ASSAY

Carry out the method for liquid chromatography, Appendix III D, using the following solutions in the mobile phase.

(1) Dilute a suitable volume of the eye drops to produce a solution containing 0.001% w/v Ofloxacin.

(2) 0.001% w/v of Ofloxacin BPCRS.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (10 cm × 4.6 mm) packed with end-capped octadecylsilyle silica gel for chromatography (3.5 µm) (Symmetry C18 is suitable).

(b) Use isocratic elution and the mobile phase described below.

(c) Use a flow rate of 2.0 mL per minute.

(d) Use an ambient column temperature.

(e) Use a detection wavelength of 294 nm.

(f) Inject 20 µL of each solution.

MOBILE PHASE

10 volumes of acetonitrile and 90 volumes of a solution containing 27.2 g/L of potassium dihydrogen phosphate, previously adjusted to pH 3.3 with orthophosphoric acid.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (2), the symmetry factor of the principal peak is not less than 0.8 and not greater than 2.0.

DETERMINATION OF CONTENT

Calculate the content of Ofloxacin, \(C_{18}H_{20}FN_3O_4\), in the eye drops from the chromatograms obtained and using the declared content of \(C_{18}H_{20}FN_3O_4\) in Ofloxacin BPCRS.
IMPURITIES

The impurities limited by the requirements of this monograph include impurity D listed under Ofloxacin.