Moxifloxacin Tablets

Moxifloxacin Tablets contain Moxifloxacin Hydrochloride equivalent to not less than 90.0 per cent and not more than 110.0 per cent of the stated amount of moxifloxacin, $C_{21}H_{24}FN_3O_4$.

Usual strength. 400 mg

Identification

A. In the Assay, the principal peak in the chromatogram obtained with the test solution corresponds to the peak in the chromatogram obtained with the reference solution.

B. When examined in the range 200 nm to 400 nm (2.4.7), the test solution obtained in the dissolution test shows an absorption maxima at the same wavelength as that of the reference solution.

Tests

Dissolution (2.5.2).
Apparatus No. 2 (Paddle),
Medium. 900 ml of *0.1 M hydrochloric acid,*
Speed and time. 50 rpm, 30 minutes.

Withdraw a suitable volume of the medium and filter. Measure the absorbance of the filtrate, suitably diluted with the dissolution medium, if necessary, at the maximum at about 296 nm (2.4.7). Calculate the content of $C_{21}H_{24}FN_3O_4$, in the medium from the absorbance obtained from 0.0009 per cent w/v solution of *moxifloxacin hydrochloride IPRS* in the same medium.

Q. Not less than 80 per cent of the stated amount of $C_{21}H_{24}FN_3O_4$.

Related substances. Determine by liquid chromatography (2.4.14).

Buffer solution A. Dissolve 1.5 g of *tetrabutylammonium hydrogen sulphate* and 1 g of *potassium dihydrogen orthophosphate* in 1000 ml of *water.* Add 2 ml of *orthophosphoric acid,* adjusted to pH 2.5 with *triethylamine* and filter.

Buffer solution B. Dissolve 0.5 g of *tetrabutylammonium hydrogen sulphate* and 1 g of *potassium dihydrogen orthophosphate* in 1000 ml of *water.* Add 2 ml of *orthophosphoric acid* and filter.

Solvent mixture. 100 volumes of buffer solution B and 1 volume of *0.1 M sodium hydroxide.*

Test solution. Disperse a quantity of the powdered tablets containing 82.5 mg of *moxifloxacin hydrochloride* in 150 ml of the solvent mixture, with the aid of ultrasound for 30 minutes with intermittent shaking and dilute to 250.0 ml with the solvent mixture. Centrifuge a portion of the solution and filter.

Reference solution (a). A 0.033 per cent w/v solution of *moxifloxacin hydrochloride IPRS* in the solvent mixture. Dilute 1.0 ml of the solution to 100.0 ml with the solvent mixture.

Reference solution (b). A 0.002 per cent w/v solution, each of, *moxifloxacin related compound F IPRS* and *moxifloxacin related compound A IPRS* in *acetonitrile*.

Reference solution(c). Dissolve 82 mg of *moxifloxacin hydrochloride IPRS* in 150 ml of the *solvent mixture,* add 4.0 ml of reference solution (b) and dilute to 250.0 ml with the solvent mixture.

Chromatographic system
- a stainless steel column 25 cm x 4.0 mm, packed with phenyl group bonded to porous silica (5 µm),
- mobile phase A. a mixture of 20 volumes of *methanol* and 80 volumes of buffer solution A,
  B. a mixture of 80 volumes of *methanol* and 20 volumes of buffer solution A,
- flow rate: 1.1 ml per minute,
- spectrophotometer set at 293 nm and 317 nm,
- injection volume: 25 µl.

Time (in min.)	Mobile phase A (per cent v/v)	Mobile phase B (per cent v/v)
0	95	5
22	95	5
39	30	70
52	30	70
53	0	100
58	0	100
58.1	95	5
70	95	5

Name	Relative retention time	Correction factor
Moxifloxacin related compound F[1*]	0.82	-
Moxifloxacin	1.0	-
Moxifloxacin related compound A[2*]	1.1	1.89
Moxifloxacin related compound B[3*]	1.26	1.3
Moxifloxacin related compound C[4*]	1.33	-
Moxifloxacin related compound D[5*]	1.38	1.32
Moxifloxacin related compound E[6*]	1.49	3.85
8-Hydroxy quinolonic acid derivative[7*]	1.72	0.77
8-Methoxy quinolonic acid derivative[8*]	1.89	0.53
8-Methoxy quinolonic ethyl ester[9*]	1.93	0.63

*Process impurities included for identification only, these impurities are monitored in the drug substances and not included in the calculation of total degradation products.

[1]1-Cyclopropyl-6-fluoro-8-methoxy-7-[(4aS,7aS)-1- methylhexahydro-1H-pyrrolo[3,4-b]pyridin-6(2H)-yl]- 4-oxo-1,4-dihydroquinoline-3-carboxylic acid.
[2]1-Cyclopropyl-6,8-difluoro-1,4-dihydro-7-[(4aS,7aS)- octahydro-6H-pyrrolo[3,4-b]pyridin-6-yl]-4-oxo-3- quinolinecarboxylic acid.
[3]1-Cyclopropyl-6,8-dimethoxy-1,4-dihydro-7-[(4a*S*,7a*S*)-octahydro-6*H*-pyrrolo[3,4-*b*]pyridin-6-yl]-4-oxo-3-quinolinecarboxylic acid.
[4]1-Cyclopropyl-8-ethoxy-6-fluoro-1,4-dihydro-7-[(4a*S*,7a*S*)-octahydro-6*H*-pyrrolo[3,4-*b*]pyridin-6-yl]-4-oxo-3-quinolinecarboxylic acid.
[5]1-Cyclopropyl-8-fluoro-6-methoxy-1,4-dihydro-7-[(4a*S*,7a*S*)-octahydro-6*H*-pyrrolo[3,4-*b*]pyridin-6-yl]-4-oxo-3-quinolinecarboxylic acid.
[6]1-Cyclopropyl-6-fluoro-8-hydroxy-1,4-dihydro-7-[(4a*S*,7a*S*)-octahydro-6*H*-pyrrolo[3,4-*b*]pyridin-6-yl]-4-oxo-3-quinolinecarboxylic acid.
[7] 1-Cyclopropyl-6,7-difluoro-8-hydroxy-4-oxo-3-quinolinecarboxylic acid.
[8] 1-Cyclopropyl-6,7-difluoro-8-methoxy-4-oxo-3-quinolinecarboxylic acid.
[9]Ethyl 1-cyclopropyl-6,7-difluoro-8-methoxy-4-oxo-3-quinolinecarboxylate.

Inject reference solution (c) and (a) at 293 nm. The test is not valid unless the resolution between the peaks due to moxifloxacin related compound F and moxifloxacin is not less than 2.0 and the peak-to-valley ratio between the peaks due to moxifloxacin and moxifloxacin related compound A is not less than 1.5 in the chromatogram obtained with reference solution (c), the tailing factor is not more than 2.0 and the relative standard deviation for replicate injections is not more than 10.0 per cent in the chromatogram obtained with reference solution (a).

Inject reference solution (a) and the test solution at 293 nm. In the chromatogram obtained with the test solution, monitor the following impurities moxifloxacin related compound F, moxifloxacin related compound A, moxifloxacin related compound C, moxifloxacin related compound D, moxifloxacin related compound E, and 8-hydroxy quinolonic acid derivative. The area of any secondary peak is not more than 0.2 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.2 per cent).

Inject reference solution (a) and the test solution at 317 nm. In the chromatogram obtained with the test solution, monitor the impurities, moxifloxacin related compound B, 8-methoxy quinolonic acid derivative, 8-methoxy quinolonic ethyl ester.

Total impurities are not more than 0.75 per cent (the sum of all the impurities at 293 nm and 317 nm). Ignore the peaks eluting before 3 minutes, after the 8-methoxy quinolonic ethylester peak and any peak with an area less than 0.05 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.05 per cent).

Other tests. Comply with the tests stated under Tablets.

Assay. Determine by liquid chromatography (2.4.14).

Buffer solution. Dissolve 1.36 g of *monobasic potassium phosphate* in *water* and dilute to 1000 ml with *water*, add 2 ml of *triethylamine*, adjusted to pH 1.9 with *orthophosphoric acid.*

Solvent mixture. 20 volumes of *methanol* and 80 volume of buffer solution.

Solution A. 30 volumes of *methanol* 3.4 volumes of *n-propyl alcohol* and 66.6 volumes of buffer solution.

Test solution. Disperse a suitable quantity of the intact tablets containing 2 g of Moxifloxacin in 200 ml of the solvent mixture, with the aid of ultrasound for about 30 minutes with intermittent shaking and dilute to 500.0 ml with the solvent mixture. Centrifuge a portion of the solution. Dilute 5.0 ml of the supernatant to 250.0 ml with the solvent mixture.

Reference solution. A 0.009 per cent w/v solution of *moxifloxacin hydrochloride IPRS* in the solvent mixture.

Chromatographic system

– a stainless steel column 25 cm × 4.6 mm, packed with phenyl groups bonded to porous silica (5 µm),
– column temperature: 45°,
– mobile phase. a mixture of 50 volumes of *acetonitrile* and 1000 volumes of solution A.
– flow rate: 1.5 ml per minute,
– spectrophotometer set at 293 nm,
– injection volume: 10 µl.

Inject the reference solution. The test is not valid unless, the tailing factor is not more than 2.0 and the relative standard deviation for replicate injections is not more than 2.0 per cent.

Inject the reference solution and the test solution.

Calculate the content of $C_{21}H_{24}FN_3O_4$ in the Tablets.

Storage. Store protected from moisture, at a temperature not exceeding 30º.