

Cabozantinib Tablets

Cabozantinib-S-Malate Tablets

Cabozantinib Tablets contains Cabozantinib-S-Malate equivalent to not less than 90.0 per cent and not more than 110.0 per cent of the stated amount of Cabozantinib, $C_{28}H_{24}FN_3O_5$.

Usual strengths. 20 mg; 40 mg; 60 mg.

CAUTION - Cabozantinib is cytotoxic; extra care required to prevent inhaling particles and exposing the skin to it.

Identification

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.

Tests

Dissolution (2.5.2).

Apparatus No. 2 (Paddle),

Medium. 900 ml of 0.01M hydrochloric acid, with 0.375 per cent of Triton X-100.

Speed and time. 75 rpm and 15 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 333 nm (2.4.7). Calculate the content of $C_{28}H_{24}FN_3O_5$ in the medium from the absorbance obtained from a solution of known concentration of *cabozantinib-S-Malate IPRS*.

Q. Not less than 80 per cent of the stated amount of $C_{28}H_{24}FN_3O_5$.

Related substances. Determine by liquid chromatography (2.4.14).

Solvent mixture. 50 volumes of acetonitrile, 50 volumes of water and 0.1 volume of trifluoroacetic acid.

Test solution. Disperse a quantity of the intact tablets containing 0.2 g of Cabozantinib in the solvent mixture, with the aid of ultrasound for 20 minutes with intermittent shaking and dilute to 200.0 ml with the solvent mixture. Dilute 5.0 ml of the solution to 10.0 ml with the solvent mixture and filter.

Reference solution (a). A 0.0634 per cent w/v solution of *Cabozantinib-S-Malate IPRS* in the Solvent mixture. Dilute 1.0 ml of the solution to 100.0 ml with solvent mixture.

Reference solution (b). Dilute 1.0 ml of reference solution (a) to 20.0 ml with the solvent mixture.

Chromatographic system

- a stainless steel column 25 cm x 4.6 mm, packed with octadecylsilane bonded to porous (5 μ m) (Such as ACE C 18),
- sample temperature: 10 $^{\circ}$,
- mobile phase: A. 0.1 per cent v/v solution of orthophosphoric acid in water,
B. acetonitrile,
- a gradient programme using the conditions given below,
- flow rate: 1.5 ml per minute,
- spectrophotometer set at 250 nm,
- injection volume: 10 μ l.

Time (in min.)	Mobile phase A (per cent v/v)	Mobile phase B (per cent v/v)
0	80	20
5	75	25
15	75	25
30	62	38
40	45	55
45	22	78

50	22	78
52	80	20
60	80	20

Name	Relative retention time
Cabozantinib impurity A ^{1*}	0.38
Open ring hydroxy Cabozantinib ²	0.71
Malic acid adduct of cabozantinib ³	0.77
Cabozantinib	1.0
Dimer of cabozantinib ⁴	1.21

*Process impurity included for identification only, this impurity is monitored in the drug substances and not included in the calculation of total degradation products.

¹1-({4-[(6,7-dimethoxyquinolin-4-yl)oxy]phenyl} carbamoyl)cyclopropanecarboxylic acid.

²N-(4-[(6,7-dimethoxyquinolin-4-yl)oxy]phenyl)-N'-(4-fluorophenyl)-2-(2-hydroxyethyl)propanediamide.

³4-(4-[(6,7-dimethoxyquinolin-4-yl)oxy]phenylamino)-3-[(4-fluorophenyl)carbamoyl]-4-oxobutoxy)-3-hydroxy-4-oxobutanoic acid.

⁴1-(4-[(4-[(6,7-dimethoxyquinolin-4-yl)oxy]phenylamino)-3-[(4-fluorophenyl)carbamoyl]-4-oxobutyl]-4-[(1-[(4-fluorophenyl)carbamoyl]Cyclopropyl)carbonyl] amino) phenoxy)-6,7-dimethoxyquinolinium.

Inject reference solution (a) and (b). The test is not valid unless the tailing factor is not more than 1.5, the relative standard deviation for replicate injections is not more than 5.0 per cent in the chromatogram obtained with reference solution (a) and the signal to noise ratio is not less than 10 in the chromatogram obtained with reference solution (b).

Inject reference solution (a) and the test solution. In the chromatogram obtained with the test solution, the area of any peak corresponding to open ring hydroxy cabozantinib and dimer of cabozantinib, each of is not more than 0.5 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.5 per cent), the area of the peak corresponding to malic acid adduct of cabozantinib is not more than the area of the principal peak in the chromatogram obtained with reference solution (a) (1.0 per cent). The area of any other secondary peak is not more than 0.5 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.5 per cent) and the sum of areas of all the secondary peaks is not more than twice the area of the principal peak in the chromatogram obtained with reference solution (a) (2.0 per cent). Ignore 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).

Assay. Determine by liquid chromatography (2.4.14).

Solvent mixture. 50 volumes of *acetonitrile*, 50 volumes of *water* and 0.1 volume of *trifluoroacetic acid*.

Test solution. Disperse a suitable quantity of the intact tablets containing 0.2 g of Cabozantinib in the solvent mixture, with the aid of ultrasound for 20 minutes with intermittent shaking and dilute to 250.0 ml with the solvent mixture. Dilute 1.0 ml of the solution to 20.0 ml with the solvent mixture and filter.

Reference solution. A 0.00507 per cent w/v solution of *Cabozantinib-S-Malate IPRS* in the Solvent mixture.

Chromatographic system

- a stainless steel column 25 cm x 4.6 mm, packed with octadecylsilane bonded to porous (5 µm) (Such as ACE C 18),
- sample temperature: 10°,
- mobile phase: a mixture of 60 volumes of a mixture of 0.2 per cent v/v solution of *orthophosphoric acid* and 0.2 per cent v/v *triethylamine* in *water* and filter, and 40 volumes of *acetonitrile*,
- flow rate: 1.8 ml per minute,
- spectrophotometer set at 250 nm,
- injection volume: 10 µl.

Inject the reference solution. The test is not valid unless, the tailing factor is not more than 1.5 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 C₂₈H₂₄FN₃O₅ in the tablets.

1 mg of Cabozantinib-S-Malate is equivalent to 0.789 mg of Cabozantinib.

Storage. Store at a temperature not exceeding 30°.

Labelling. The label states the strength in terms of the equivalent amount of Cabozantinib.

DRAFT FOR COMMENTS