Edition: BP 2025 (Ph. Eur. 11.6 update)

Pantoprazole for Injection

General Notices

Action and use

Proton pump inhibitor; treatment of peptic ulcer disease.

DEFINITION

Pantoprazole for Injection is a sterile material consisting of Pantoprazole Sodium Sesquihydrate with or without excipients. It is supplied in a sealed container.

The contents of the sealed container comply with the requirements for Powders for Injections or Infusions stated under Parenteral Preparations and with the following requirements.

Content of pantoprazole, $C_{16}H_{15}F_2N_3O_4S$

93.0 to 105.0% of the stated amount.

IDENTIFICATION

Shake a quantity of the powder containing the equivalent of 40 mg of pantoprazole with 10 mL of *acetone*, filter (Whatman GF/C is suitable) and evaporate to dryness. Dry the residue at 60° for 30 minutes. The *infrared absorption spectrum* of the residue, Appendix II A, is concordant with the *reference spectrum* of pantoprazole sodium *(RS 488)*.

TESTS

Alkalinity

pH of a solution containing the equivalent of 0.4% w/v of pantoprazole, 9.0 to 11.5, Appendix V L.

Clarity and colour of solution

A solution containing the equivalent of 0.4% w/v of pantoprazole is *clear*, Appendix IV A, and not more intensely coloured than *reference solution* B_5 or BY_5, Appendix IV B, Method II.

Related substances

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

Prepare a solution containing equal volumes of *acetonitrile* and 0.001M *sodium hydroxide* (solution A).

(1) Shake a quantity of the powder for injection containing the equivalent of 40 mg of pantoprazole in 50 mL of solution A, dilute with sufficient solution A to produce 100 mL and filter.
(2) Dilute 1 volume of solution (1) to 20 volumes. Dilute 1 volume of this solution to 10 volumes.

(3) 0.05% w/v of *pantoprazole for system suitability EPCRS* in solution A.
(4) Dilute 1 volume of solution (2) to 5 volumes.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (12.5 cm × 4 mm) packed with *octadecylsilyl silica gel for chromatography* (5 µm) (Hypersil ODS is suitable).
(b) Use gradient elution and the mobile phase described below.
(c) Use a flow rate of 1 mL per minute.
(d) Use a column temperature of 40°.
(e) Use an autosampler temperature of 5°.
(f) Use a detection wavelength of 290 nm.
(g) Inject 20 µL of each solution.

MOBILE PHASE

Mobile phase A 0.01M *dipotassium hydrogen phosphate trihydrate*, adjusted to pH 7.0 with a 20% v/v solution of *orthophosphoric acid*.

Mobile phase B 1 volume of *water* and 99 volumes of *acetonitrile*.

Time (Minutes)	Mobile phase A (% v/v)	Mobile phase B (% v/v)	Comment
0-3	90	10	isocratic
3-33	90→60	10→40	linear gradient
33-48	60→15	40→85	linear gradient
48-50	15→90	85→10	linear gradient
50-60	90	10	re-equilibration

When the chromatograms are recorded under the prescribed conditions the retention times relative to pantoprazole (retention time about 22 minutes) are: impurity C, about 0.6; impurity A, about 0.9; impurity D + F, about 1.1; impurity E, about 1.3 and impurity B, about 1.4.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to impurity D + F and pantoprazole is greater than 3.0.

LIMITS

Identify any peak in the chromatogram obtained with solution (1) due to impurity C using the chromatogram obtained with solution (3) and multiply the area of this peak by a correction factor of 0.6.

In the chromatogram obtained with solution (1):

the area of any peak due to impurities D + F (combined peak area) is not greater than 3 times the area of the principal peak in the chromatogram obtained with solution (2) (1.5%);

the area of any peak due to impurity A is not greater than the area of the principal peak in the chromatogram obtained with solution (2) (0.5% of each);

the area of any other *secondary peak* is not greater than 0.4 times the area of the principal peak in the chromatogram obtained with solution (2) (0.2%);

the sum of the areas of any *secondary peaks* is not greater than 4 times the area of the principal peak in the chromatogram obtained with solution (2) (2.0%).

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

ASSAY

Determine the weight of the contents of 10 containers as described in the test for *uniformity of weight*, Appendix XII C1, Powders for Parenteral Use.

Carry out the method for *liquid chromatography*, Appendix III D, using the following solutions.

Prepare a solution containing equal volumes of *acetonitrile* and 0.001M *sodium hydroxide* (solution A).

(1) Prepare 10 injections following the manufacturer's instructions and combine the resulting solutions. Dilute a quantity of the resulting solution with sufficient solution A to produce a solution containing the equivalent of 0.004% w/v of pantoprazole.
(2) 0.0045% w/v of *pantoprazole sodium BPCRS* in solution A.
(3) 0.0045% w/v of *pantoprazole sodium BPCRS* and 0.0005% w/v of *pantoprazole impurity A BPCRS* in solution A.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (12.5 cm × 4 mm) packed with *octadecylsilyl silica gel for chromatography* (5 µm) (Hypersil ODS is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 1 mL per minute.
(d) Use an ambient column temperature.
(e) Use an autosampler temperature of 5°.
(f) Use a detection wavelength of 290 nm.
(g) Inject 20 µL of each solution.

MOBILE PHASE

35 volumes of *acetonitrile*, and 65 volumes of 0.01M *dipotassium hydrogen phosphate trihydrate*, previously adjusted to pH 7.0 with a 20% v/v solution of *orthophosphoric acid*.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to impurity A and pantoprazole is at least 1.5.

DETERMINATION OF CONTENT

Calculate the content of $C_{16}H_{15}F_2N_3O_4S$ in the powder for injection from the chromatograms obtained and using the declared content of $C_{16}H_{15}F_2N_3O_4S$ in *pantoprazole sodium BPCRS*.

STORAGE

The sealed container should be protected from light and stored at a temperature not exceeding 25°.

LABELLING

The quantity of the active ingredient is stated in terms of the equivalent amount of pantoprazole.

IMPURITIES

The impurities limited by this monograph include those listed under Pantoprazole Sodium Sesquihydrate.