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

Verapamil Injection

General Notices

Action and use

Calcium channel blocker.

DEFINITION

Verapamil Injection is a sterile solution of Verapamil Hydrochloride in Water for Injections.

The injection complies with the requirements stated under Parenteral Preparations and with the following requirements.

Content of verapamil hydrochloride, $C_{27}H_{38}N_2O_4$,HCl

95.0 to 105.0% of the stated amount.

IDENTIFICATION

In the Assay, record the UV spectrum of the principal peak in the chromatograms obtained with solutions (1) and (2) with a diode array detector in the range of 210 to 400 nm.

The UV spectrum of the principal peak in the chromatogram obtained with solution (1) is concordant with that of the peak in the chromatogram obtained with solution (2);

the retention time of the principal peak in the chromatogram obtained with solution (1) is similar to that of the peak in the chromatogram obtained with solution (2).

TESTS

Acidity

pH, 4.5 to 6.0, Appendix V L.

Related substances

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

(1) Dilute a volume of the injection, if necessary, to produce a solution containing 0.125% w/v of Verapamil Hydrochloride.
(2) Dilute 1 volume of solution (1) to 50 volumes. Further dilute 1 volume to 10 volumes.
(3) 0.005% w/v of *verapamil hydrochloride BPCRS* and 0.005% w/v of *verapamil impurity I EPCRS*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (12.5 cm × 4 mm) packed with *end-capped octadecylsilyl silica gel for chromatography* (3 µm) (Hypersil ODS is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 0.85 mL per minute.
(d) Use an ambient column temperature.
(e) Use a detection wavelength of 278 nm.
(f) Inject 10 µL of each solution.
(g) Allow the chromatography to proceed for 4 times the retention time of verapamil.

MOBILE PHASE

1 volume of *2-heptylamine*, 4.7 volumes of *glacial acetic acid*, 58 volumes of *acetonitrile* and 137 volumes of 0.01M *sodium acetate*.

When the chromatograms are recorded under the prescribed conditions, the retention times relative to verapamil (retention time about 6 minutes) are: impurity I, about 0.9 and impurity M, about 2.4.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to impurity I and verapamil is at least 2.0.

LIMITS

In the chromatogram obtained with solution (1):

the area of any *secondary peak* is not greater than 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 1.5 times the area of the principal peak in the chromatogram obtained with solution (2) (0.3%).

Disregard any peak with an area less than half of the area of the principal peak in the chromatogram obtained with solution (2) (0.1%).

ASSAY

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

(1) Dilute a volume of the injection, if necessary, to produce a solution containing 0.0125% w/v of Verapamil Hydrochloride.
(2) 0.0125% w/v of *verapamil hydrochloride BPCRS*.
(3) 0.005% w/v of *verapamil hydrochloride BPCRS* and 0.005% w/v of *verapamil impurity I EPCRS*.

CHROMATOGRAPHIC CONDITIONS

The chromatographic conditions described under Related substances may be used.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to impurity I and verapamil is at least 2.0.

DETERMINATION OF CONTENT

Calculate the content of verapamil hydrochloride, $C_{27}H_{38}N_2O_4$,HCl, in the injection from the chromatograms obtained and using the declared content of $C_{27}H_{38}N_2O_4$,HCl in *verapamil hydrochloride BPCRS*.

STORAGE

Verapamil Injection should be protected from light.

IMPURITIES

The impurities limited by the requirements of this monograph include impurities D, E, F, G, I, J, K and M listed under Verapamil Hydrochloride.