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

Ephedrine Injection

General Notices

Action and use

Adrenoceptor agonist; reversal of hypotension from spinal or epidural anaesthesia.

DEFINITION

Ephedrine Injection is a sterile solution of Ephedrine Hydrochloride. It is supplied as a ready-to-use solution in Water for Injections or it is prepared immediately before use in accordance with the manufacturer's instructions from Ephedrine Sterile Concentrate.

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

When supplied as a ready-to-use solution, the injection complies with the following requirements.

Content of ephedrine hydrochloride, $C_{10}H_{15}NO,HCl$

95.0 to 105.0% of the stated amount.

IDENTIFICATION

To a quantity of the injection containing 10 mg of Ephedrine Hydrochloride add 2 mL of *2M hydrochloric acid*, shake with two 20-mL quantities of *dichloromethane* and discard the dichloromethane. Add 5M *ammonia* until the aqueous layer is alkaline, extract with two 30-mL quantities of a mixture of 3 volumes of *dichloromethane* and 1 volume of *ethanol*, dry the combined extracts over *anhydrous sodium sulfate*, filter and evaporate to dryness at a pressure of 2 kPa, heating gently to remove the last traces of solvent. The *infrared absorption spectrum* of the residue, Appendix II A, is concordant with the *reference spectrum* of ephedrine hydrochloride *(RS 436)*.

TESTS

Acidity or alkalinity

pH, 4.5 to 7.0, Appendix V L.

Related substances

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

(1) Dilute a volume of the injection, if necessary, with sufficient of the mobile phase to produce a solution containing 0.75% w/v of Ephedrine Hydrochloride.
(2) Dilute 1 volume of solution (1) to 500 volumes with mobile phase.
(3) 0.01% w/v of *ephedrine hydrochloride BPCRS* and 0.01% w/v of *pseudoephedrine hydrochloride BPCRS* in mobile phase.
(4) Dilute 1 volume of solution (2) to 10 volumes with mobile phase.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (25 cm × 4.6 mm) packed with *phenyl silica gel for chromatography* (5 µm) (Spherisorb Phenyl 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 a detection wavelength of 257 nm.
(f) Inject 20 µL of each solution.
(g) Allow the chromatography to proceed for three times the retention time of the peak due to ephedrine.

MOBILE PHASE

6 volumes of *methanol* and 94 volumes of a 1.16% w/v solution of *ammonium acetate* adjusted to pH 4.0 using *glacial acetic acid*.

When the chromatograms are recorded under the prescribed conditions, the retention time of ephedrine is about 13 minutes and the retention time of pseudoephedrine is about 16 minutes.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the peaks due to ephedrine and pseudoephedrine 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 2.5 times the area of the principal peak in the chromatogram obtained with solution (2) (0.5%).

Disregard any peak with an area less than the area of the principal peak in the chromatogram obtained with solution (4) (0.02%).

ASSAY

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

(1) Dilute the injection with *methanol (80%)* to produce a solution containing 0.1% w/v of Ephedrine Hydrochloride.
(2) 0.1% w/v of *ephedrine hydrochloride BPCRS* in *methanol (65%)*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (20 cm × 4.6 mm) packed with *end-capped octadecylsilyl silica gel for chromatography* (10 µm) (Nucleosil C18 is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 2 mL per minute.
(d) Use an ambient column temperature.
(e) Use a detection wavelength of 263 nm.
(f) Inject 20 µL of each solution.

MOBILE PHASE

0.005M *dioctyl sodium sulfosuccinate* in a mixture of 1 volume of *glacial acetic acid*, 35 volumes of *water* and 65 volumes of *methanol*.

DETERMINATION OF CONTENT

Calculate the content of $C_{10}H_{15}NO,HCl$ in the injection using the declared content of $C_{10}H_{15}NO,HCl$ in *ephedrine hydrochloride BPCRS*.

EPHEDRINE STERILE CONCENTRATE

DEFINITION

Ephedrine Sterile Concentrate is a sterile solution of Ephedrine Hydrochloride in Water for Injections.

The concentrate complies with the requirements for Concentrates for Injections or Infusions stated under Parenteral Preparations and with the following requirements.

Content of ephedrine hydrochloride, $C_{10}H_{15}NO,HCl$

95.0 to 105.0% of the stated amount.

IDENTIFICATION

To a quantity of the concentrate containing 10 mg of Ephedrine Hydrochloride add 2 mL of *2M hydrochloric acid*, shake with two 20-mL quantities of *dichloromethane* and discard the dichloromethane. Add 5M *ammonia* until the aqueous layer is alkaline, extract with two 30-mL quantities of a mixture of 3 volumes of *dichloromethane* and 1 volume of *ethanol*, dry the combined extracts over *anhydrous sodium sulfate*, filter and evaporate to dryness at a pressure of 2 kPa, heating gently to remove the last traces of solvent. The *infrared absorption spectrum* of the residue, Appendix II A, is concordant with the *reference spectrum* of ephedrine hydrochloride *(RS 436)*.

TESTS

Acidity

pH, 4.5 to 7.0, Appendix V L.

Related substances

Carry out the method described in the requirements for the ready to use injection.

ASSAY

Carry out the Assay described in the requirements for the ready to use injection.