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

Adrenaline Eye Drops / Epinephrine Eye Drops

General Notices

Neutral Adrenaline Eye Drops
Neutral Epinephrine Eye Drops

Action and use

Adrenoceptor agonist; treatment of glaucoma.

DEFINITION

Adrenaline Eye Drops are a sterile solution of Adrenaline in Purified Water.

The eye drops comply with the requirements stated under Eye Preparations and with the following requirements. Where appropriate, the eye drops also comply with the requirements stated under Unlicensed Medicines.

Content of adrenaline, $C_9H_{13}NO_3$

95.0 to 110.0% of the stated amount.

IDENTIFICATION

A. In the Assay, the retention time of the principal peak in the chromatogram obtained with solution (1) is the same as that of the principal peak in the chromatogram obtained with solution (2).
B. Dilute the eye drops to contain 0.1% w/v of Adrenaline and adjust the pH, if necessary, to neutral or slightly acidic. To 1 mL of this solution add, drop wise, a 0.25% w/v solution of *iron (III) chloride hexahydrate* until a green colour is produced. On the gradual addition of *sodium hydrogen carbonate solution*, the solution changes first to blue and then to red.
C. Dilute the eye drops to contain 0.1% w/v of Adrenaline. To 1 mL of this solution add 2 mL of a 10% w/v solution of *disodium hydrogen orthophosphate* and sufficient *iodinated potassium iodide solution* to produce a brown colour. Remove excess iodine by adding 0.2M *sodium thiosulfate* drop wise; a red colour is produced.

TESTS

Acidity or alkalinity

pH, 5.5 to 7.6, Appendix V L.

Noradrenaline

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

(1) Dilute the eye drops to produce a solution containing 0.10% w/v of Adrenaline.
(2) 0.0018% w/v of *noradrenaline acid tartrate*.
(3) 0.0018% w/v of *noradrenaline acid tartrate* and 0.0018% w/v of *adrenaline acid tartrate BPCRS*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (10 cm × 4.6 mm) packed with *end-capped octadecylsilyl silica gel for chromatography* (5 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 205 nm.
(f) Inject 20 µL of each solution.

MOBILE PHASE

A solution containing 4.0 g of *tetramethylammonium hydrogen sulfate*, 1.1 g of *sodium heptanesulfonate* and 2 mL of 0.1M *disodium edetate* in a mixture of 950 mL of *water* and 50 mL of *methanol*, the pH of the mixture being adjusted to 3.5 with 1M *sodium hydroxide*.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the two principal peaks is at least 2.0.

LIMITS

In the chromatogram obtained with solution (1):

the area of any peak corresponding to noradrenaline is not greater than the area of the principal peak in the chromatogram obtained with solution (2) (1%).

ASSAY

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

(1) Dilute the eye drops with sufficient mobile phase to produce a solution containing 0.1% w/v of Adrenaline.
(2) 0.2% w/v of *adrenaline acid tartrate BPCRS* in the mobile phase.
(3) 0.2% w/v of *adrenaline acid tartrate BPCRS* and 0.2% w/v of *noradrenaline acid tartrate*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (10 cm × 4.6 mm) packed with *end-capped octadecylsilyl silica gel for chromatography* (5 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 205 nm.
(f) Inject 20 µL of each solution.

MOBILE PHASE

A solution prepared by adding 4.0 g of *tetramethylammonium hydrogen sulfate*, 1.1 g of *sodium heptanesulfonate* and 2 mL of 0.1M *disodium edetate* to a mixture of 950 mL of *water* and 50 mL of *methanol*, the pH of the mixture being adjusted to 3.5 with 1M *sodium hydroxide*.

SYSTEM SUITABILITY

The Assay is not valid unless, in the chromatogram obtained with solution (3), the *resolution* between the two principal peaks is at least 2.0.

DETERMINATION OF CONTENT

Calculate the content of $C_9H_{13}NO_3$ in the eye drops using the declared content of $C_9H_{13}NO_3$ in *adrenaline acid tartrate BPCRS*.

STORAGE

Adrenaline Eye Drops should be protected from light.