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

Betamethasone Valerate and Coal Tar Paste

General Notices

NOTE: *This monograph has been developed to cover unlicensed formulations.*

Action and use

Used in the treatment of psoriasis.

DEFINITION

Betamethasone Valerate and Coal Tar Paste contains Betamethasone Valerate and Coal Tar in a suitable basis containing Zinc Oxide.

The paste complies with the requirements stated under Topical Semi-solid Preparations and with the following requirements. Where appropriate, the paste also complies with the requirements stated under Unlicensed Medicines.

Content of betamethasone valerate, $C_{27}H_{37}FO_6$

90.0 to 110.0% of the stated amount.

Content of zinc oxide, ZnO

90.0 to 110.0% of the stated amount.

IDENTIFICATION

A. Carry out the method for *thin-layer chromatography*, Appendix III A, using the following solutions.
(1) Shake a quantity of the paste containing 20 µg of Betamethasone Valerate in 10 mL of *chloroform* and filter (Whatman No. 1 paper is suitable). Evaporate the *chloroform* to dryness and extract the residue with 1 mL of a mixture of 30 volumes of *methanol* and 70 volumes of *water*.
(2) 20 µg of *betamethasone valerate BPCRS* in a mixture of 30 volumes of *methanol* and 70 volumes of *water*.

CHROMATOGRAPHIC CONDITIONS

(a) Use as the coating *silica gel GF_{254}*.
(b) Use the mobile phase as described below.
(c) Apply 20 µL of each solution.
(d) Develop the plate to 15 cm.
(e) After removal of the plate, dry in air and examine under *ultraviolet light (254 nm)*. Heat the plate at 105° for 5 minutes and spray while warm with a mixture containing 1 volume of a 0.2% w/v solution of *alkaline tetrazolium blue* in *methanol* and 9 volumes of 10% w/v *methanolic sodium hydroxide*.

MOBILE PHASE

Mix 1 volume of *ethyl acetate*, 1 volume of *water* and 2 volumes of *1,2 –dichloroethane*. Use the lower layer.

CONFIRMATION

By each method of visualisation, the principal spot in the chromatogram obtained with solution (1) corresponds in position and intensity to that in the chromatogram obtained with solution (2).

B. In the Assay for betamethasone valerate, the chromatogram obtained with solution (1) shows a peak with the same retention time as the principal peak in the chromatogram obtained with solution (2).
C. Heat 0.5 g of the paste gently in a porcelain dish over a small flame until the basis is completely volatilised or charred. Increase the heat until all the carbon is removed. The residue obtained is yellow when hot and white when cool.

ASSAY

For betamethasone valerate

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

(1) 0.1% w/v of *beclometasone dipropionate BPCRS* (internal standard) in *methanol*.
(2) To a quantity of the paste containing 0.25 mg of Betamethasone Valerate add 1 mL of solution (1) and 10 mL of *chloroform*. Mix using a vortex mixer and filter (Whatman No. 1 filter paper is suitable), rinsing with a further 10 mL of *chloroform*. Evaporate the filtrate in a water bath at 40° to 50° in a current of air. Dissolve the residue in 25 mL of *hexane* and transfer to a separating funnel containing 20 mL of *ethanolic hydrochloric acid*, washing the flask with *hexane*. Repeat the extraction with two 10-mL quantities of *ethanolic hydrochloric acid*, filtering the extracts through absorbent cotton, and add sufficient *ethanolic hydrochloric acid* to produce 50 mL.
(3) 0.05% w/v of *betamethasone valerate BPCRS* in *methanol*.
(4) Dilute 1 volume of solution (1) and 1 volume of solution (3) to 50 volumes with *ethanolic hydrochloric acid*.

CHROMATOGRAPHIC CONDITIONS

(a) Use a stainless steel column (25 cm × 4.6 mm) packed with *base-deactivated, end-capped octadecylsilyl silica gel for chromatography* (5 µm) (Hypersil BDS C18 is suitable).
(b) Use isocratic elution and the mobile phase described below.
(c) Use a flow rate of 0.8 mL per minute.
(d) Use an ambient column temperature.
(e) Use a detection wavelength of 240 nm.
(f) Inject 20 µL of solutions (2), (3) and (4).

MOBILE PHASE

4 volumes of *water* and 6 volumes of *acetonitrile*.

When the chromatograms are recorded under the prescribed conditions, the retention time for betamethasone valerate is about 8 minutes and the retention time for beclometasone dipropionate is about 14 minutes.

SYSTEM SUITABILITY

The test is not valid unless, in the chromatogram obtained with solution (4), the *resolution* between the two principal peaks is at least 1.0.

DETERMINATION OF CONTENT

Calculate the content of $C_{27}H_{37}FO_6$ in the paste using the declared content of $C_{27}H_{37}FO_6$ in *betamethasone valerate BPCRS*.

For zinc oxide

Heat 0.5 g of the paste gently in a porcelain dish over a small flame until the basis is completely volatilised or charred. Increase the heat until all the carbon is removed. Dissolve the residue in 10 mL of 2M *acetic acid* and add sufficient *water* to produce 50 mL. To the resulting solution add 50 mg of *xylenol orange triturate* and sufficient *hexamine* to produce a violet-pink colour. Add a further 2 g of *hexamine* and titrate with 0.1M *disodium edetate VS* until the solution becomes yellow. Each mL of 0.1M *disodium edetate VS* is equivalent to 8.138 mg of ZnO.

STORAGE

Betamethasone Valerate and Coal Tar Paste should be stored at a temperature of 2° to 8°.