Calculate the percentage content of nonivamide using the following expression:

$$\frac{F_1 \times m_2 \times p_1}{F_2 \times m_1}$$

F_1 = area of the peak due to nonivamide in the chromatogram obtained with the test solution;

F_2 = area of the peak due to nonivamide in the chromatogram obtained with the reference solution;

m_1 = mass of the tincture to be examined, in grams;

m_2 = mass of *nonivamide CRS* in the reference solution, in grams;

p_1 = percentage content of nonivamide in *nonivamide CRS*.

Limit:

– *nonivamide*: maximum 5.0 per cent of the total capsaicinoid content.

Ethanol (*2.9.10*): 95 per cent to 105 per cent of the content stated on the label.

Methanol and 2-propanol (*2.9.11*): maximum 0.05 per cent *V/V* of methanol and maximum 0.05 per cent *V/V* of 2-propanol.

ASSAY

Liquid chromatography (*2.2.29*) as described in the test for nonivamide.

Calculate the percentage content of total capsaicinoids, expressed as capsaicin, using the following expression:

$$\frac{(F_3 + F_5 + F_6) \times m_4 \times p_2}{F_4 \times m_3}$$

F_3 = area of the peak due to capsaicin in the chromatogram obtained with the test solution;

F_4 = area of the peak due to capsaicin in the chromatogram obtained with the reference solution;

F_5 = area of the peak due to dihydrocapsaicin in the chromatogram obtained with the test solution;

F_6 = area of the peak due to nordihydrocapsaicin in the chromatogram obtained with the test solution;

m_3 = mass of the tincture to be examined, in grams;

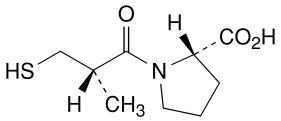
m_4 = mass of *capsaicin CRS* in the reference solution, in grams;

p_2 = percentage content of capsaicin in *capsaicin CRS*.

01/2008:1079

CAPTOPRIL

Captoprilum



$C_9H_{15}NO_3S$ M_r 217.3

[62571-86-2]

DEFINITION

(2*S*)-1-[(2*S*)-2-Methyl-3-sulphanylpropanoyl]pyrrolidine-2-carboxylic acid.

Content: 98.0 per cent to 101.5 per cent (dried substance).

CHARACTERS

Appearance: white or almost white, crystalline powder.

Solubility: freely soluble in water, in methylene chloride and in methanol. It dissolves in dilute solutions of alkali hydroxides.

IDENTIFICATION

Infrared absorption spectrophotometry (*2.2.24*).

Comparison: *captopril CRS*.

TESTS

Solution S. Dissolve 0.5 g in *carbon dioxide-free water R* and dilute to 25.0 ml with the same solvent.

Appearance of solution. Solution S is clear (*2.2.1*) and colourless (*2.2.2, Method II*).

pH (*2.2.3*): 2.0 to 2.6 for solution S.

Specific optical rotation (*2.2.7*): – 127 to – 132 (dried substance).

Dissolve 0.250 g in *anhydrous ethanol R* and dilute to 25.0 ml with the same solvent.

Related substances. Liquid chromatography (*2.2.29*).

Test solution. Dissolve 50 mg of the substance to be examined in the mobile phase and dilute to 100.0 ml with the mobile phase.

Reference solution (a). Dilute 2.0 ml of the test solution to 100.0 ml with the mobile phase.

Reference solution (b). Dissolve 10 mg of the substance to be examined in the mobile phase, add 0.25 ml of *0.05 M iodine* and dilute to 100.0 ml with the mobile phase. Dilute 10.0 ml of the solution to 100.0 ml with the mobile phase.

Column:

– *size*: *l* = 0.125 m, Ø = 4 mm,

– *stationary phase*: *octylsilyl silica gel for chromatography R* (5 µm).

Mobile phase: *phosphoric acid R, methanol R, water R* (0.05:50:50 *V/V/V*).

Flow rate: 1 ml/min.

Detection: spectrophotometer at 220 nm.

Injection: 20 µl.

Run time: 3 times the retention time of captopril.

System suitability: reference solution (b):

– the chromatogram shows 3 peaks,

– *resolution*: minimum 2.0 between the last 2 eluting principal peaks.

Limits:

– *any impurity*: for each impurity, not more than 0.5 times the area of the principal peak in the chromatogram obtained with reference solution (a) (1.0 per cent),

– *total*: not more than the area of the principal peak in the chromatogram obtained with reference solution (a) (2.0 per cent),

– *disregard limit*: 0.1 times the area of the principal peak in the chromatogram obtained with reference solution (a) (0.2 per cent). Disregard any peak with a retention time less than 1.4 min.

Heavy metals (*2.4.8*): maximum 20 ppm.

1.0 g complies with limit test C. Prepare the reference solution using 2 ml of *lead standard solution (10 ppm Pb) R*.

Loss on drying (*2.2.32*): maximum 1.0 per cent, determined on 1.000 g by drying under high vacuum at 60 °C for 3 h.

Sulphated ash (*2.4.14*): maximum 0.2 per cent, determined on 1.0 g.

ASSAY

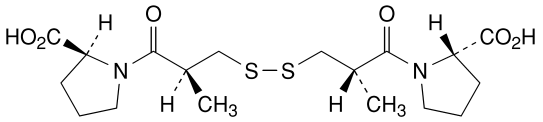
Dissolve 0.150 g in 30 ml of *water R*. Titrate with *0.05 M iodine*, determining the end-point potentiometrically (*2.2.20*). Use a combined platinum electrode.

1 ml of *0.05 M iodine* is equivalent to 21.73 mg of $C_9H_{15}NO_3S$.

STORAGE

In an airtight container.

IMPURITIES



A. (2*S*,2′*S*)-1,1′-[disulphanediylbis[(2*S*)-2-methyl-1-oxopropane-3,1-diyl]-bis[pyrrolidine-2-carboxylic] acid (captopril-disulphide).

01/2008:1080

CARAWAY FRUIT

Carvi fructus

DEFINITION

Whole, dry mericarp of *Carum carvi* L.

Content: minimum 30 ml/kg of essential oil (anhydrous drug).

CHARACTERS

Odour reminiscent of carvone.

IDENTIFICATION

A. The fruit is a cremocarp of almost cylindrical shape. It is generally 3-6.5 mm long and 1-1.5 mm wide. The mericarps, usually free, are greyish-brown or brown, glabrous, mostly sickle-shaped, with both ends sharply terminated. Each bears 5 prominent narrow ridges. When cut transversely the profile shows an almost regular pentagon and 4 vittae on the dorsal surface and 2 on the commissural surface may be seen with a lens.

B. Reduce to a powder (355) (*2.9.12*). The powder is yellowish-brown. Examine under a microscope using *chloral hydrate solution R*. The powder shows the following diagnostic characters: fragments of the secretory cells composed of yellowish-brown or brown, thin-walled, polygonal secretory cells, frequently associated with a layer of thin-walled, transversely elongated cells, 8-12 µm wide; fragments of the epicarp with thick-walled cells and occasional anomocytic stomata (*2.8.3*); numerous endosperm fragments containing aleurone grains, droplets of fatty oil and microcrystals of calcium oxalate in rosette formation; spiral vessels accompanied by sclerenchymatous fibres; rarely some fibre bundles from the carpophore; groups of rectangular to sub-rectangular sclereids from the mesocarp with moderately thickened and pitted walls may be present.

C. Thin-layer chromatography (*2.2.27*).

Test solution. Shake 0.5 g of the powdered drug (710) (*2.9.12*) with 5.0 ml of *ethyl acetate R* for 2-3 min. Filter over 2 g of *anhydrous sodium sulphate R*.

Reference solution. Dissolve 2 µl of *carvone R* and 5 µl of *olive oil R* in 1.0 ml of *ethyl acetate R*.

Plate: *TLC silica gel plate R*.

Mobile phase: *ethyl acetate R*, *toluene R* (5:95 *V/V*).

Application: 20 µl of the test solution and 10 µl of the reference solution, as bands.

Development: over a path of 10 cm.

Drying: in air.

Detection A: examine in ultraviolet light at 254 nm.

Results A: the chromatograms obtained with the test solution and with the reference solution show a quenching zone (carvone) in the central part against a light background.

Detection B: spray with *anisaldehyde solution R* and, while observing, heat at 100-105 °C for 2-4 min; examine in daylight.

Results B: the zones due to carvone are dark orange-brown; the chromatogram obtained with the test solution shows above the zone due to carvone a violet zone similar in position and colour to the zone due to triglycerides of olive oil in the chromatogram obtained with the reference solution; the chromatogram obtained with the test solution shows close to the solvent front a weak violet zone due to terpene hydrocarbons and in the lower part some weak, mostly violet-greyish and brownish zones.

TESTS

Water (*2.2.13*): maximum 100 ml/kg, determined on 10.0 g of powdered drug.

Total ash (*2.4.16*): maximum 7.0 per cent.

ASSAY

Carry out the determination of essential oils in herbal drugs (*2.8.12*). Use 10.0 g of drug reduced to a powder (710) (*2.9.12*) immediately before the determination, a 500 ml round-bottomed flask, 200 ml of *water R* as the distillation liquid, and 0.50 ml of *xylene R* in the graduated tube. Distil at a rate of 2-3 ml/min for 90 min.

01/2008:1817

CARAWAY OIL

Carvi aetheroleum

DEFINITION

Oil obtained by steam distillation from the dry fruits of *Carum carvi* L.

CHARACTERS

Appearance: clear, colourless or yellow liquid.

IDENTIFICATION

First identification: *B*.

Second identification: *A*.

A. Thin-layer chromatography (*2.2.27*).

Test solution. Dissolve 40 µl of the substance to be examined in 1.0 ml of *toluene R*.