

CAYENNE PEPPER FOR HOMOEOPATHIC PREPARATIONS

CAPSICUM ANNUUM FOR HOMOEOPATHIC PREPARATIONS

Capsicum annuum ad praeparationes homoeopathicas

Other Latin name used in homoeopathy: **Capsicum**

DEFINITION

Dried, ripe fruit of *Capsicum annuum* L.

Content. minimum 0.065 per cent of total capsaicinoids, expressed as capsaicin (C₁₈H₂₇NO₃; M_r 305.4) (dried drug).

IDENTIFICATION

While operating pay great attention to the toxicity of the compounds of the drug and the reference products.

- A. Glossy berry either yellow or red when ripe, quadrangular comprising 2 to 4 loculi, battered about 12 cm long, bearing remnants of the calyx. Numerous, yellow, kidney-like seeds.
- B. Reduce to a powder (355). The powder is yellow to red. Examine under a microscope, using *chloral hydrate solution R*: fragments of pericarp containing an epicarp with rows of 5-7 cells often aligned and an evenly striated cuticle, parenchymatous cells often containing red, oil droplets and sometimes cuneiform, calcium oxalate microcrystals and an endocarp composed of sclerenchymatous cells arranged in characteristic clusters, split up by parenchymatous cells with a thin cell-wall; fragments of seed with epispem consisting of greenish-yellow sclereids with sinuous cell-walls, thin outer cell-walls and inside, radial cell-walls, markedly and unevenly thickened; conspicuously pitted, albumen composed of parenchymatous cells containing oil droplets and aleurone granules, 3-6 µm in diameter; scarce fragments from the calyx with outside epidermis with stomata of anisocytic type (2.8.3), inside epidermis with stomata bearing numerous secretory trichomes with uniseriate foot and multicellular head and mesophyll with numerous cells with calcium oxalate sand.
- C. Thin layer chromatography (2.2.27).

Test solution. Add 30 mL of *ethanol (90 per cent V/V) R* to 3.0 g of powdered drug (500). Heat under a reflux condenser on a water-bath at 60 °C for 15 min. Allow the plate to cool. Filter.

Reference solution. Dissolve 2 mg of *capsaicin R* and 2 mg of *dihydrocapsaicin R* in 5 mL of *methanol R*.

Plate: TLC octadecylsilyl silica gel plate *R*.

Mobile phase: water *R*, methanol *R* (20:80 V/V).

Application: 20 µL as bands.

Development: over a path of 12 cm.

The General Chapters and General Monographs of the European Pharmacopoeia and Preamble of the French Pharmacopoeia apply.

Drying: in air.

Detection: spray with a 5 g/L solution of *dichloroquinonechlorimide R* in *methanol R*. Expose the plate to ammonia vapour until blue zones appear. Examine in daylight.

Results: see below the sequence of zones present in the chromatograms obtained with the reference solution and the test solution. Furthermore other faint zones may be present in the chromatogram obtained with the test solution.

Top of the plate	
-----	-----
Capsaicin: a blue zone Dihydrocapsaicin: a blue zone	A blue zone (capsaicin) A more or less intense blue zone (dihydrocapsaicin)
-----	-----
Reference solution	Test solution

TESTS

Loss on drying (2.2.32): maximum 11.0 per cent, determined on 1.000 g of powdered drug (500), by drying in an oven at 105 °C for 2 h.

Total ash (2.4.16): maximum 8.0 per cent.

Capsicum frutescens. The presence of berries smaller than 3 cm long shows adulteration by *Capsicum frutescens* L.

ASSAY

Liquid chromatography (2.2.29).

Test solution. Add 75 mL of *methanol R* to 2.500 g of powdered drug (500). Allow to macerate for 30 min. Place in an ultrasonic bath for 15 min. Filter the whole quantity into a 100.0 mL volumetric flask, rinse and dilute to 100.0 mL with *methanol R*.

Reference solution. In a 100.0 mL volumetric flask, place 20.0 mg of *capsaicin CRS*, 10.0 mg of *dihydrocapsaicin R*, 4.0 mg of *nonivamide R* and dilute with *methanol R*.

Column:

- size: $l = 0.250$ m, $\varnothing = 4.6$ mm,
- stationary phase: *phenylsilyl silica gel for chromatography R* (5 μ m),
- temperature: 30 °C.

Mobile phase: *acetonitrile R*, 1g/L solution of *phosphoric acid R* (40:62 V/V).

Flow rate: 1.0 mL/min.

Detection: spectrophotometer at 225 nm.

Injection: 10 μ L.

Elution order: nordihydrocapsaicin, nonivamide, capsaicin, dihydrocapsaicin.

The General Chapters and General Monographs of the European Pharmacopoeia and Preamble of the French Pharmacopoeia apply.

System suitability: reference solution:

- *resolution*: minimum 3.0 between the peaks due to capsaicin and nonivamide.

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

$$\frac{(A_1 + A_2 + A_3) \times m_2 \times p}{A_4 \times m_1}$$

A_1 = area of the peak due to capsaicin in the chromatogram obtained with the test solution,

A_2 = area of the peak due to dihydrocapsaicin in the chromatogram obtained with the test solution,

A_3 = area of the peak due to nordihydrocapsaicin in the chromatogram obtained with the test solution,

A_4 = area of the peak due to capsaicin in the chromatogram obtained with the reference solution,

m_1 = mass of the drug sample, in grams,

m_2 = mass of capsaicin in the reference solution, in grams,

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

STOCK

DEFINITION

Cayenne pepper mother tincture is prepared with ethanol (90 per cent V/V) using the dried, ripe fruit of *Capsicum annum* L.

Content: minimum 0.005 per cent *m/V* of total capsaicinoids, expressed as capsaicin ($C_{18}H_{27}NO_3$; M_r 305.4).

PRODUCTION

Method 1.1.10 (2371). Drug roughly powered or fragmented into 1-3 cm long segments. Maceration time: 3-5 weeks.

CHARACTERS

Appearance: orange liquid.

IDENTIFICATION

Thin layer chromatography (2.2.27).

Test solution. Mother tincture.

Reference solution. Dissolve 2 mg of *capsaicin R* and 2 mg of *dihydrocapsaicin R* in 10 mL of *methanol R*.

Plate: TLC octadecylsilyl silica gel plate *R*.

The General Chapters and General Monographs of the European Pharmacopoeia and Preamble of the French Pharmacopoeia apply.

Mobile phase: water R, methanol R (20:80 V/V)

Application: 20 µL as bands.

Development: over a path of 12 cm.

Drying: in air.

Detection: spray with a 5 g/L solution of *dichloroquinonechlorimide R* in *methanol R*. Expose the plate to ammonia vapour until blue zones appear. Examine in daylight.

Results: see below the sequence of zones present in the chromatograms obtained with the reference solution and the test solution. Furthermore other faint zones may be present in the chromatogram obtained with the test solution.

Top of the plate	
-----	-----
Capsaicin: a blue zone Dihydrocapsaicin: a blue zone	A blue zone (capsaicin) A more or less intense blue zone (dihydrocapsaicin)
-----	-----
Reference solution	Test solution

TESTS

Ethanol (2.9.10): 85 per cent V/V to 95 per cent V/V.

Dry residue (2.8.16): minimum 0.7 per cent *m/m*.

ASSAY

Liquid chromatography (2.2.29).

Test solution. Mother tincture.

Reference solution. In a 100.0 mL volumetric flask, place 20.0 mg of capsaicin CRS, 10.0 mg of dihydrocapsaicin R and 4.0 mg of nonivamide R and dilute with methanol R. In a 10.0 mL volumetric flask, place 1.0 mL of this solution and dilute with methanol R.

Column:

- size: $l = 0.250$ m, $\varnothing = 4.6$ mm,
- stationary phase: *phenylsilyl silica gel for chromatography R* (5 µm),
- temperature: 30 °C.

Mobile phase: acetonitrile R, 1g/L solution of *phosphoric acid R* (40:62 V/V).

Flow rate: 1.0 mL/min.

Detection: spectrophotometer at 225 nm.

Injection: 10 µL.

Elution order: nordihydrocapsaicin, nonivamide, capsaicin, dihydrocapsaicin.

The General Chapters and General Monographs of the European Pharmacopoeia and Preamble of the French Pharmacopoeia apply.

System suitability: reference solution:

- *resolution*: minimum 3.0 between the peaks due to capsaicin and nonivamide.

Calculate the percentage content m/V of total capsaicinoids, expressed as capsaicin, from the expression:

$$\frac{(A_1 + A_2 + A_3) \times m \times p}{A_4 \times 1000}$$

A_1 = area of the peak due to capsaicin in the chromatogram obtained with the test solution,

A_2 = area of the peak due to dihydrocapsaicin in the chromatogram obtained with the test solution,

A_3 = area of the peak due to nordihydrocapsaicin in the chromatogram obtained with the test solution,

A_4 = area of the peak due to capsaicin in the chromatogram obtained with the reference solution,

m = mass of capsaicin in the reference solution, in grams,

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

The General Chapters and General Monographs of the European Pharmacopoeia and Preamble of the French Pharmacopoeia apply.