GOLDENROD
FOR HOMOEOPATHIC PREPARATIONS

SOLIDAGO VIRGA AUREA
FOR HOMOEOPATHIC PREPARATIONS

Solidago virgaurea ad praeparationes homoeopathicas

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

DEFINITION

Fresh, flowering aerial part of *Solidago virgaurea* L.

IDENTIFICATION

A. Striated, cylindrical stem that maybe thoroughly glabrous or pubescent and covered with short hairs curved upwards. Alternate, caulinary leaves, elliptical with entire margin or slightly dentate; sessile or shortly petioled; both sides glabrous or slightly pubescent; underside with prominent reticulate nervation. Inflorescences in racemes of 5-6 capitulae, peduncle base bearing 2 small linear bracts with scarious edge; involucre 5-7 mm long, composed of 2-4 irregular rows of bracts interwoven, greenish-yellow, smooth and glossy on the inside surface, pubescent or glabrous on the outside surface, scarious on the edges; raceme of yellow flowers on the periphery and 6-12 female, ligulate, widely spaced, about twice longer than the bracts and in the middle about 10-30 hermaphrodite tubular flowers; inferior ovary, brown, narrowing at its base and showing a ribbed surface covered of scattered pilosity; whitish pappus composed of smooth or rough bristles.

B. Take a sample of epidermis of goldenrod. Examine under a microscope, using *chloral hydrate solution R*: epidermis covered with striated cuticle, composed of cells with sinuous or polygonal cell-walls, anomocytic stomata (*2.8.3*) with 3-4 subsidiary cells, flagellate covering trichomes composed of 1-3 stiff, basal cells and one long distal cell, with thin, flexuous cell-walls. Multicellular covering trichomes (4-8 cells) about 400 µm long, all of them oriented towards the tip of the leaf, conspicuous on the lamina margin.

TESTS

Foreign matter (*2.8.2*): maximum 5 per cent.

Loss on drying (*2.2.32*): minimum 60.0 per cent, determined on 5.0 g of finely-cut drug, by drying in an oven at 105 °C for 2 h.

Other species of goldenrod: the presence of inflorescences displayed in curved, unilateral racemes with involucres 3-5 mm long, shows adulteration by *Solidago gigantea* Ait. Panicles with involucres 2-3 mm long and ligulate florets hardly any longer shows adulteration by *Solidago canadensis* L.

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

STOCK

DESCRIPTION

Goldenrod mother tincture is prepared with *ethanol* (55 per cent *V/V*), using the fresh, flowering aerial part of *Solidago virgaurea* L.

Content: minimum 0.02 per cent *m/m* of total flavonoids, expressed as hyperoside ($C_{21}H_{20}O_{12}$; M_r 464.4).

PRODUCTION

Method 1.1.10 (2371). Drug fragmented into segments 5-7 cm long. Maceration time: 3-5 weeks.

CHARACTERS

Appearance: brownish-green liquid.

IDENTIFICATION

Thin-layer chromatography (*2.2.27*).

Carry out the test as described in “Solidago gigantea and Solidago canadensis”.

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

Top of the plate	
	A light blue zone
Quercitrin: an orange zone	
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Chlorogenic acid: a light blue zone Rutin: an orange zone	A light blue zone (chlorogenic acid) An orange zone (rutin)
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Reference solution	**Test solution**

TESTS

Ethanol (*2.9.10*): 50 per cent *V/V* to 60 per cent *V/V*.

Dry residue *(2.8.16)*: minimum 1.5 per cent *m/m.*

Solidago gigantea and Solidago canadensis

Thin-layer chromatography (*2.2.27*).

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

Test solution. Mother tincture.

Reference solution. Dissolve 1.0 mg of *chlorogenic acid R*, 2.5 mg of *quercitrin R* and 2.5 mg of *rutin R* in 10 mL of *methanol R*.

Plate: *TLC silica gel plate R.*

Mobile phase: *anhydrous formic acid R, water R, methyl ethyl ketone R, ethyl acetate R* (6:6:18:30 *V/V/V/V*).

Application: 20 µL, as bands.

Development: over a path of 10 cm.

Drying: in air.

Detection: first spray with a 10 g/L solution of *diphenylboric acid aminoethyl ester R* in *methanol R* then with a 50 g/L solution of *macrogol 400 R* in *methanol R.* Allow the plate to dry for about 30 min. Examine in ultraviolet light at 365 nm.

Results: the chromatogram obtained with the test solution does not present any clear, orange, fluorescent zone similar to the position of the zone of quercitrin in the chromatogram obtained with the reference solution.

ASSAY

Ultraviolet and visible absorption spectrophotometry (*2.2.25*).

Stock solution. Evaporate 18.00 g of mother tincture, under reduced pressure then add 1 mL of a 5 g/L solution of *hexamethylenetetramine R*, 20 mL of *acetone R* and 7 mL of *hydrochloric acid R1*. Heat under a reflux condenser in a water-bath for 30 min. After cooling to room temperature, transfer the solution into a 100.0 mL volumetric flask and dilute to 100.0 mL with *acetone R,* rinsing the flask. Place 25.0 mL of this solution in a separating funnel and add 25 mL of *water R*. Shake the mixture once with 15 mL then 3 times with 10 mL of *ethyl acetate R*. Combine the organic layers in a separating funnel, wash with 2 quantities each of 50 mL of *water R*. Filter on about 10 g of *anhydrous sodium sulfate R* and collect the filtrate in a 50.0 mL volumetric flask. Rinse the separating funnel and the sodium sulfate with *ethyl acetate* R and dilute to 50.0 mL with the same solvent.

Test solution. To 10.0 mL of stock solution, add 1.0 mL of *aluminium chloride reagent R* and dilute to 25.0 mL with a solution of *glacial acetic acid* (5 per cent *V/V*) in *methanol R*.

Compensation liquid. Take 10.0 mL of stock solution and dilute to 25.0 mL with a solution of *glacial acetic acid* (5 per cent *V/V*) in *methanol R*.

Thirty min after the addition of the last reagent, measure the absorbance of the test solution at 425 nm, in comparison with the compensation liquid.

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

Calculate the percentage content *m/m* in total flavonoids, expressed as hyperoside, from the expression:

$$\frac{A \times 500}{m \times 500}$$

i.e taking the specific absorbance of hyperoside to be 500 at 425 nm.

A = absorbance of the test solution at 425 nm,
m = mass of the mother tincture sample, in the test solution, in grams.

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