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Powdered *Rhodiola rosea*

DEFINITION

Powdered *Rhodiola rosea* is *Rhodiola rosea* L. reduced to a powder or fine powder. It contains NLT 0.3% of phenylpropanoid glycosides, calculated as the sum of rosarin, rosavin, and rosin, and NLT 0.08% of salidroside, both calculated on the dried basis.

IDENTIFICATION

• **A.** Powdered *Rhodiola rosea* meets the requirements under *Specific Tests, Botanic Characteristics*.

• **B. THIN-LAYER CHROMATOGRAPHY**

Standard solution A: 1.0 mg/mL of [USP Rosavin RS](#) in methanol

Standard solution B: 50 mg/mL of [USP Rhodiola rosea Root and Rhizome Dry Extract RS](#) in methanol. Sonicate for 10 min, centrifuge, and use the supernatant.

Sample solution: Sonicate for 10 min about 0.5 g of Powdered *Rhodiola rosea* in 5 mL of methanol, centrifuge, and use the supernatant.

Chromatographic system

(See [Chromatography \(621\), Thin-Layer Chromatography](#).)

Adsorbent: Chromatographic silica gel with an average particle size of 5 µm (HPTLC plates)

Application volume: 3 µL of *Standard solution A* and 5 µL each of *Standard solution B* and *Sample solution*; as 8-mm bands

Relative humidity: Condition the plate to a relative humidity of about 33% using a suitable device.

Developing solvent system: A mixture of ethyl acetate, methanol, water, and formic acid (77:13:10:2)

Developing distance: 6 cm

Derivatization reagent: Dissolve 1 g of diphenylamine in 40 mL of acetone, add 1 mL of aniline, and mix. Carefully add 7.5 mL of phosphoric acid, and mix.

Analysis

Samples: *Standard solution A*, *Standard solution B*, and *Sample solution*

Apply the samples as bands to a suitable high performance thin-layer chromatographic plate, and dry in air. Develop the chromatograms in a saturated chamber, remove the plate from the chamber, and dry in air. Derivatize the plate with *Derivatization reagent*, heat at 120° for 5 min, and examine under visible light.

System suitability: The chromatogram of *Standard solution B* exhibits, in the lower half, three gray bands and two brownish bands, one above and the other below the gray bands; the most intense band in the chromatogram is the brownish band with an R_f below the gray bands; the most intense gray band is the lower band at an R_f corresponding to the band due to rosavin in the chromatogram of *Standard solution A*; the upper gray band due to rosarin is less intense.

Acceptance criteria: The chromatogram of the *Sample solution* exhibits a gray band corresponding to the band due to rosavin in the chromatogram of *Standard solution A*, and the following bands corresponding to similar bands in the chromatogram of *Standard solution B*: two additional gray bands and two brownish bands, one above and the other below the gray bands; the most intense band in the chromatogram is the brownish band with an R_f below the gray bands; the most intense gray band is the lower band due to rosavin.

• **C. HPLC**

Analysis: Proceed as directed in the test for *Content of Phenylpropanoid Glycosides and Salidroside*.

Acceptance criteria: The chromatogram of the *Sample solution* exhibits peaks at the retention times corresponding to the peaks due to salidroside, tyrosol, rosarin, rosavin, rosin, and rosiridin in the chromatogram of *Standard solution C*. The ratio of the content of the phenylpropanoid glycosides, rosarin, rosavin, and rosin, to the content of salidroside is about 3:1.

COMPOSITION

• **CONTENT OF PHENYLPROPENOID GLYCOSIDES AND SALIDROSIDE**

Solution A: Water

Solution B: Acetonitrile

Mobile phase: See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	94	6
6	83	17
7	80.3	19.7
9	80.3	19.7
10	0	100
12	94	6
17	94	6

Solvent: 75% methanol in water

Standard solution A: 1.0 mg/mL of [USP Rosavin RS](#) in methanol

Standard solution B: 0.3 mg/mL of [USP Salidroside RS](#) in methanol

Standard solution C: 4.0 mg/mL of [USP Rhodiola rosea Root and Rhizome Dry Extract RS](#) in methanol. Sonicate to dissolve, if necessary.

Before injection, pass through a membrane filter of 0.45-μm or finer pore size.

Sample solution: Transfer about 5.0 g of Powdered *Rhodiola rosea*, accurately weighed, to a 25-mL flask. Add 7 mL of *Solvent*, sonicate for 15 min, and filter into a 10-mL volumetric flask. Wash the residue on the filter paper twice using 1 mL of *Solvent* each, add the washings to the volumetric flask, dilute with *Solvent* to volume, and mix. Before injection, pass through a membrane filter of 0.45-μm or finer pore size, discarding the first few mL of filtrate.

Chromatographic system

(See [Chromatography \(621\), System Suitability](#).)

Mode: LC

Detector: UV 205 nm

Column: 3.0-mm × 10-cm; 2.5-μm packing L1

Column temperature: 40 ± 1°

Flow rate: 1.0 mL/min

Injection volume: 1 μL

System suitability

Samples: *Standard solution A* and *Standard solution C*

Suitability requirements

Chromatogram similarity: The chromatogram obtained from *Standard solution C* is similar to the reference chromatogram provided with the lot of [USP Rhodiola rosea Root and Rhizome Dry Extract RS](#) being used.

Resolution: NLT 1.5 between the rosin and rosin peaks, *Standard solution C*

Relative standard deviation: NMT 2% determined from the rosin peak in repeated injections, *Standard solution A*

Analysis

Samples: *Standard solution A*, *Standard solution B*, *Standard solution C*, and *Sample solution*

Using the chromatograms of *Standard solution A*, *Standard solution B*, *Standard solution C*, and the reference chromatogram provided with the lot of [USP Rhodiola rosea Root and Rhizome Dry Extract RS](#) being used, identify the retention time of the peaks corresponding to salidroside, tyrosol, rosin, rosin, and rosin from the *Sample solution*.

Separately calculate the percentages of rosin, rosin, and rosin as rosin in the portion of Powdered *Rhodiola rosea* taken:

$$\text{Result} = (r_U/r_S) \times C_S \times (V/W) \times 100$$

r_U = peak area of the relevant analyte from the *Sample solution*

r_S = peak area of rosin from *Standard solution A*