Ipecacuanha root (Ipecacuanhae radix)

Description. Odour, slight; taste, bitter, nauseous and acrid.

Category. Expectorant; emetic.

Storage. Ipecacuanha root should be kept in a well-closed container, protected from light.

Additional information. Even in the absence of light, the powder of Ipecacuanha root is gradually degraded on exposure to a humid atmosphere, the decomposition being faster at higher temperatures.

Requirements

Definition. Ipecacuanha root consists of the dried rhizome and roots of *Cephaëlis ipecacuanha* (Brotero) A. Richard (Fam. Rubiaceae) or of *Cephaëlis acuminata* Karsten, or of a mixture of both species. The principal alkaloids are emetine and cephaëline.

Ipecacuanha root contains not less than 2.0% of total alkaloids, calculated as emetine.

Macroscopic characteristics

Cephaëlis ipecacuanha. Dark brick-red to very dark brown, somewhat tortuous root, seldom more than 15 cm long or 6 mm thick; the root is closely annulated externally, having rounded ridges completely encircling it; the fracture is short in the bark and splintery in the wood; a transversely cut surface shows a wide greyish bark and a small uniformly dense wood. The rhizomes are short lengths attached to roots; they are cylindrical, up to 2 mm in diameter, finely wrinkled longitudinally, and with pith occupying approximately one-sixth of the whole diameter.

Cephaëlis acuminata. In general it resembles the root of *Cephaëlis ipecacuanha,* but differs in the following particulars: often up to 9 mm thick; external surface greyish brown or reddish brown with transverse ridges at intervals of about 1-3 mm; the ridges are about 0.5-1 mm wide, extending about half-way round the circumference and fading at the extremities into the general surface level.

Microscopic characteristics

Cephaëlis ipecacuanha. A transverse section of the root shows a narrow, brown cork layer of thin-walled polyhedral, tubular cells and a wide parenchymatous zone of phelloderm; the latter contains abundant starch, consisting of simple granules and compound granules of 2-8 components, the individual granules being oval, rounded, or roughly hemispherical, and seldom more than 15 µm in diameter; the phloem is present as a narrow unlignified zone; the xylem is dense, consisting mainly of narrow tracheids intermixed with a smaller proportion of vessels, both with numerous bordered pits in their lateral walls, the vessel element having simple circular perforations; crystal cells, each containing a bundle of raphides, 30-80 µm long, occur in the parenchymatous regions. A transverse section through an internode of the rhizome shows several layers of thin-walled cork, a somewhat collenchymatous cortex, a pericycle containing groups of large, distinctly pitted sclereids, a narrow ring of phloem, and a wide ring of xylem surrounding a pith composed of thin-walled, pitted, parenchymatous cells.

Cephaëlis acuminata. Similar to *Cephaëlis ipecacuanha* except that the individual starch granules may be up to 22 µm in diameter.

Identity test

Carry out the test as described under *1.14.1 Chromatography*, Thin-layer chromatography, using silica gel R1 as the coating substance and a mixture of 93 volumes of chloroform R, 6.5 volumes of methanol R, and 0.5 volumes of ammonia (~260 g/l) TS as the mobile phase, and allow the solvent front to ascend only 10 cm above the line of application. Apply separately to the plate as bands, 20 mm by 3 mm, 10 µl of each of the following solutions: for solution A, add to 0.1 g of finely powdered test substance in a small test-tube, 0.05 mL of ammonia (~260 g/l) TS and 5 mL of chloroform R, stir vigorously with a glass rod, allow to stand for 30 minutes and filter; for solution B, dilute 1 mL of solution A to 25 mL with chloroform R; for solution C, dissolve 5 mg of emetine hydrochloride RS and 6 mg of cephaëline hydrochloride R in sufficient methanol R to produce 20 mL. After removing the plate from the chromatographic chamber, allow it to dry in air until the odour of solvent is no longer detectable, spray it with a mixture of 0.05 g of iodine R in 10 mL of chloroform R, and heat it at 60°C for 10 minutes. Examine the chromatogram first in daylight; a lemon-yellow zone appears at about midpoint, corresponding to emetine, and below it a light brown zone, corresponding to cephaëline. Then examine the chromatogram in ultraviolet light (365 nm); the zone corresponding to emetine shows an intense yellow fluorescence, and that corresponding to cephaëline, a light blue fluorescence. The chromatogram obtained with solution A shows, in addition, several very small zones due to secondary alkaloids. The chromatogram obtained with solution B shows only 2 zones, which correspond to those obtained with solution C.

With *Cephaëlis ipecacuanha,* the zone corresponding to cephaëline obtained with solution A is much smaller than the corresponding zone obtained with solution C.

With *Cephaëlis acuminata,* the principal zones obtained with solution A correspond in position, appearance, and intensity with

those obtained with solution C.

Ash. Carry out the procedure as described under 4.1 Determination of ash and acid-insoluble ash; not more than 60 mg/g.

Acid-insoluble ash. Carry out the procedure as described under 4.1 Determination of ash and acid-insoluble ash; not more than 30 mg/g.

Foreign matter. Weigh about 200 g and spread it in a thin layer on a glass plate. Detect the foreign matter by eye or with the use of a 6× lens, separate it from the root, and weigh it; not more than 10 mg/g.

Assay. Weigh accurately about 7.5 g of finely powdered test substance, transfer it to a dry flask, add 100 mL of ether R, and shake for 5 minutes. Add 5 mL of ammonia (~100 g/l) TS, shake frequently during 1 hour, add 5 mL of water, and shake vigorously; decant the ether layer into a dry flask, filtering through a plug of adsorbent cotton. Wash the residue with two quantities, each of 25 mL of ether R, decanting each portion and filtering through the same plug of adsorbent cotton. Remove most of the solvent from the combined ether extracts by distillation and the remainder by gentle warming with a current of air blown into the flask. Dissolve the residue in 5 mL of previously neutralized ethanol (~710 g/l) TS by warming on a water-bath, add 15 mL of hydrochloric acid (0.1 mol/l) VS and titrate the excess of acid with sodium hydroxide (0.1 mol/l) VS, using 0.5 mL of methyl red/methylthioninium chloride TS as indicator. Each mL of hydrochloric acid (0.1 mol/l) VS is equivalent to 24.03 mg of total alkaloids, calculated as emetine.