Cellacefate (Cellacefatum)

Chemical name. Cellulose acetate phthalate; cellulose acetate 1,2-benzenedicarboxylate; CAS Reg. No. 9004-38-0.

Other names. Cellulose acetate phthalate; cellacephate.

Description. A white, free-flowing powder or colourless flakes; odourless or with a faint odour of acetic acid.

Solubility. Practically insoluble in water and ethanol (~750 g/l) TS; freely soluble in acetone R; soluble in dioxan R; dissolves in dilute solutions of alkali.

Category. Enteric coating agent for solid oral dosage forms.

Storage. Cellacefate should be kept in a well-closed container, and stored in a cool and dry place.

Additional information. Cellacefate is hygroscopic.

Requirements

Definition. Cellacefate is a cellulose, some of the hydroxyl groups of which are esterified by phthaloyl groups and others by acetyl groups.

Cellacefate contains not less than **30.0%** and not more than the equivalent of **40.0%** of phthaloyl groups ($C_8H_5O_3$, relative molecular mass = 149.1) and not less than **17.0%** and not more than the equivalent of **26.0%** of acetyl groups (C_2H_3O, relative molecular mass = 43.05), both calculated with reference to the anhydrous substance.

Identity tests

A. To 10 mg add 1.0 mL of ethanol (~750 g/l) TS and 1 mL of sulfuric acid (~1760 g/l) TS, and warm; ethyl acetate, perceptible by its odour (*proceed with caution*), is produced.

B. Transfer 10 mg to a small test-tube, add 10 mg of resorcinol R and 0.5 mL of sulfuric acid (~1760 g/l) TS, and mix. Heat in a liquid bath at 160 °C for 3 minutes. Cool and pour the solution into a mixture of 25 mL of sodium hydroxide (1 mol/l) VS and 200 mL of water; a vivid green fluorescence is observed in the solution.

C. Dissolve 0.1 g in 1 mL of acetone R and pour onto a clear glass plate; as the solvent evaporates, a glossy, clear film remains.

Free acid. Shake 1.0 g of finely powdered material with 100 mL of carbon-dioxide-free water R for 5 minutes and filter. Wash the flask and the filter with two quantities, each of 10 mL, of carbon-dioxide-free water R. Combine the filtrate and washings, add 0.1 mL of phenolphthalein/ethanol TS, and titrate with carbonate-free sodium hydroxide (0.1 mol/l) VS until a faint pink colour is obtained. Repeat the procedure without the Cellacefate being examined and make any necessary corrections.

Each mL of carbonate-free sodium hydroxide (0.1 mol/l) VS is equivalent to 8.306 mg of phthalic acid. Not more than 60 mg/g (6.0%) is found, calculated as phthalic acid and with reference to the anhydrous substance.

Sulfated ash. Not more than 1.0 mg/g.

Water. Determine as described under 2.8 Determination of water by the Karl Fischer method, Method A, using 0.5 g and 20 mL of a mixture of equal volumes of dehydrated methanol R and chloroform R; the water content is not more than 50 mg/g (5.0%).

Assays

A. Phthaloyl groups **.** Dissolve about 0.4 g, accurately weighed, in 20 mL of ethylene glycol monomethyl ether R previously neutralized using 0.1 mL of phenolphthalein/ethanol TS. Titrate with carbonate-free sodium hydroxide (0.1 mol/l) VS until a faint pink colour is obtained.

Calculate the content of phthaloyl groups in %: $\frac{149\,n}{(100-a)m} - 1.795\,S$

where n is the number of mL of carbonate-free sodium hydroxide (0.1 mol/l) VS used, a is the content of water in %, m is the mass of Cellacefate in g, and S is the content of free acid in %.

B. Acetyl groups **.** To about 0.1 g, accurately weighed, add 25 mL of carbonate-free sodium hydroxide (0.1 mol/l) VS and heat on a water-bath under a reflux condenser for 30 minutes. Cool, add 0.1 mL of phenolphthalein/ethanol TS, and titrate with hydrochloric acid (0.1 mol/l) VS until the colour is discharged. Repeat the procedure without the Cellacefate being examined and make any necessary corrections.

Calculate the content of acetyl groups in %: $$\frac{43(n_2 - n_1)}{(100 - a)m} - (0.578P + 0.518S)$$

where n_2 is the number of mL of hydrochloric acid (0.1 mol/l) VS used for the blank, n_1 is the number of mL of hydrochloric acid (0.1 mol/l) VS used for Cellacefate, a is the content of water in %, m is the mass of Cellacefate in g, P is the content of phthaloyl groups in %, and S is the content of free acid in %.