Mobile phase: dissolve 0.212 g of *anhydrous sodium carbonate R* and 63 mg of *sodium hydrogen carbonate R* in *water for chromatography R* and dilute to 1000.0 mL with the same solvent.

Flow rate of the mobile phase: 2 mL/min.

Suppressor regeneration solution: 1.23 g/L solution of *sulfuric acid R* in *water for chromatography R*.

Flow rate of the suppressor regeneration solution: 4 mL/min.

Detection: conductance.

Injection: 50 µL.

System suitability: reference solution:

– *repeatability*: maximum relative standard deviation of 2.0 per cent for the area of the peak due to oxalate after 5 injections.

Inject 50 µL of each solution 3 times. Calculate the content of oxalates in parts per million using the following expression:

$$\frac{S_T \times 50}{S_R - S_T}$$

S_T = area of the peak due to oxalate in the chromatogram obtained with the test solution;

S_R = area of the peak due to oxalate in the chromatogram obtained with the reference solution.

Limit:

– *oxalates*: maximum 100 ppm.

Sucrose and reducing sugars. Dissolve 0.5 g in a mixture of 2 mL of *hydrochloric acid R1* and 10 mL of *water R*. Boil for 5 min, allow to cool, add 10 mL of *sodium carbonate solution R* and allow to stand for 10 min. Dilute to 25 mL with *water R* and filter. To 5 mL of the filtrate add 2 mL of *cupri-tartaric solution R* and boil for 1 min. Allow to stand for 2 min. No red precipitate is formed.

Chlorides (*2.4.4*): maximum 50 ppm.

To 10 mL of previously filtered solution S add 5 mL of *water R*.

Phosphates (*2.4.11*): maximum 100 ppm.

Dilute 1 mL of solution S to 100 mL with *water R*.

Sulfates (*2.4.13*): maximum 50 ppm, determined on previously filtered solution S.

Prepare the standard using a mixture of 7.5 mL of *sulfate standard solution (10 ppm SO_4) R* and 7.5 mL of *distilled water R*.

Iron: maximum 5 ppm.

Atomic absorption spectrometry (*2.2.23, Method I*).

Test solution. Introduce 2.0 g into a 100 mL polytetrafluoroethylene beaker and add 5 mL of *nitric acid R*. Boil, evaporating almost to dryness. Add 1 mL of *strong hydrogen peroxide solution R* and evaporate again almost to dryness. Repeat the hydrogen peroxide treatment until a clear solution is obtained. Using 2 mL of *nitric acid R*, transfer the solution into a 25 mL volumetric flask. Dilute to 25.0 mL with *dilute hydrochloric acid R*. In the same manner, prepare a compensation solution using 0.65 g of *calcium chloride R1* instead of the substance to be examined.

Reference solutions. Prepare the reference solutions from *iron standard solution (20 ppm Fe) R*, diluting with *dilute hydrochloric acid R*.

Source: iron hollow-cathode lamp.

Wavelength: 248.3 nm.

Atomisation device: air-acetylene flame.

Carry out a basic correction using a deuterium lamp.

Magnesium and alkali metals: maximum 0.4 per cent.

To 0.50 g add a mixture of 1.0 mL of *dilute acetic acid R* and 10.0 mL of *water R* and rapidly boil, whilst shaking, until completely dissolved. To the boiling solution add 5.0 mL of *ammonium oxalate solution R* and allow to stand for at least 6 h. Filter through a sintered-glass filter (1.6) (*2.1.2*) into a porcelain crucible. Carefully evaporate the filtrate to dryness and ignite. The residue weighs not more than 2 mg.

Bacterial endotoxins (*2.6.14*): less than 167 IU/g.

Microbial contamination

TAMC: acceptance criterion 10^2 CFU/g (*2.6.12*).

ASSAY

Dissolve 0.350 g in 20 mL of hot *water R*, allow to cool and dilute to 300 mL with *water R*. Carry out the complexometric titration of calcium (*2.5.11*). Use 50 mg of *calconecarboxylic acid triturate R*.

1 mL of *0.1 M sodium edetate* is equivalent to 44.84 mg of $C_{12}H_{22}CaO_{14},H_2O$.

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CALCIUM GLYCEROPHOSPHATE

Calcii glycerophosphas

$C_3H_7CaO_6P$ M_r 210.1

DEFINITION

Mixture in variable proportions of the calcium salt of (*RS*)-2,3-dihydroxypropyl phosphate and of 2-hydroxy-1-(hydroxymethyl)ethyl phosphate which may be hydrated.

Content: 18.6 per cent to 19.4 per cent of Ca (dried substance).

CHARACTERS

Appearance: white or almost white powder, hygroscopic.

Solubility: sparingly soluble in water, practically insoluble in ethanol (96 per cent).

IDENTIFICATION

A. Mix 1 g with 1 g of *potassium hydrogen sulfate R* in a test tube fitted with a glass tube. Heat strongly and direct the white vapour towards a piece of filter paper impregnated with a freshly prepared 10 g/L solution of *sodium nitroprusside R*. The filter paper develops a blue colour in contact with *piperidine R*.

B. Ignite 0.1 g in a crucible. Take up the residue with 5 mL of *nitric acid R* and heat on a water-bath for 1 min. Filter. The filtrate gives reaction (b) of phosphates (*2.3.1*).

C. It gives reaction (b) of calcium (*2.3.1*).

TESTS

Solution S. Dissolve 1.5 g at room temperature in *carbon dioxide-free water R* prepared from *distilled water R* and dilute to 150 mL with the same solvent.

Appearance of solution. Solution S is not more opalescent than reference suspension III (*2.2.1*).

Acidity or alkalinity. To 100 mL of solution S add 0.1 mL of *phenolphthalein solution R*. Not more than 1.5 mL of *0.1 M hydrochloric acid* or 0.5 mL of *0.1 M sodium hydroxide* is required to change the colour of the indicator.

Citric acid. Shake 5.0 g with 20 mL of *carbon dioxide-free water R* and filter. To the filtrate add 0.15 mL of *sulfuric acid R* and filter again. To the filtrate add 5 mL of *mercuric sulfate solution R* and heat to boiling. Add 0.5 mL of a 3.2 g/L solution of *potassium permanganate R* and again heat to boiling. No precipitate is formed.

Glycerol and ethanol (96 per cent)-soluble substances: maximum 0.5 per cent.

Shake 1.000 g with 25 mL of *ethanol (96 per cent) R* for 1 min. Filter. Evaporate the filtrate on a water-bath and dry the residue at 70 °C for 1 h. The residue weighs a maximum of 5 mg.

Chlorides (*2.4.4*): maximum 500 ppm.

Dissolve 0.1 g in a mixture of 2 mL of *acetic acid R* and 8 mL of *water R* and dilute to 15 mL with *water R*.

Phosphates (*2.4.11*): maximum 400 ppm.

Dilute 2.5 mL of solution S to 100 mL with *water R*.

Sulfates (*2.4.13*): maximum 0.1 per cent, determined on solution S.

Arsenic (*2.4.2, Method A*): maximum 3 ppm.

Dissolve 0.33 g in *water R* and dilute to 25 mL with the same solvent.

Iron (*2.4.9*): maximum 50 ppm, detemined on 0.20 g.

Loss on drying (*2.2.32*): maximum 12.0 per cent, determined on 1.000 g by drying in an oven at 150 °C for 4 h.

ASSAY

Dissolve 0.200 g in *water R*. Carry out the complexometric titration of calcium (*2.5.11*).

1 mL of *0.1 M sodium edetate* is equivalent to 4.008 mg of Ca.

01/2017:0981

CALCIUM HYDROGEN PHOSPHATE

Calcii hydrogenophosphas

$CaHPO_4$ M_r 136.1
[7757-93-9]

DEFINITION

Content: 98.0 per cent to 103.0 per cent.

CHARACTERS

Appearance: white or almost white, crystalline powder, or colourless crystals.

Solubility: practically insoluble in water and in ethanol (96 per cent). It dissolves in dilute hydrochloric acid and in dilute nitric acid.

IDENTIFICATION

A. Dissolve with heating 0.1 g in 10 mL of *dilute hydrochloric acid R*. Add 2.5 mL of *dilute ammonia R1*, shake, and add 5 mL of a 35 g/L solution of *ammonium oxalate R*. A white precipitate is produced.

B. Dissolve 0.1 g in 5 mL of *dilute nitric acid R*, add 2 mL of *ammonium molybdate solution R* and heat at 70 °C for 2 min. A yellow precipitate is produced.

C. It complies with the limits of the assay.

TESTS

Solution S. Dissolve 2.5 g in 20 mL of *dilute hydrochloric acid R*, filter if necessary and add *dilute ammonia R1* until a precipitate is formed. Add just sufficient *dilute hydrochloric acid R* to dissolve the precipitate and dilute to 50 mL with *distilled water R*.

Acid-insoluble substances: maximum 0.2 per cent.

Dissolve 5.0 g in 40 mL of *water R*, add 10 mL of *hydrochloric acid R* and heat to boiling for 5 min. Cool, then collect the insoluble substances using ashless filter paper. Wash with *water R* until turbidity is no longer produced when *silver nitrate solution R2* is added. Ignite at 600 ± 50 °C. The residue weighs not more than 10 mg.

Carbonates. Shake 0.5 g with 5 mL of *carbon dioxide-free water R* and add 1 mL of *hydrochloric acid R*. No effervescence is produced.

Chlorides: maximum 0.25 per cent.

Test solution. Dissolve 0.20 g in a mixture of 20 mL of *water R* and 13 mL of *dilute nitric acid R* by warming if necessary, dilute to 100 mL with *water R* and filter if necessary. Use 50 mL of this solution.

Reference solution. To 0.70 mL of *0.01 M hydrochloric acid*, add 6 mL of *dilute nitric acid R* and dilute to 50 mL with *water R*.

Add 1 mL of *silver nitrate solution R2* to the test solution and to the reference solution and mix. After standing for 5 min protected from light, any opalescence in the test solution is not more intense than that in the reference solution.

Fluorides: maximum 100 ppm.

Potentiometry (*2.2.36, Method II*).

Chelating solution. Dissolve 45 g of *cyclohexylenedinitrilotetraacetic acid R* in 75 mL of *sodium hydroxide solution R* and dilute to 250 mL with *water R*.

Test solution. Dissolve 1.000 g in 4 mL of *hydrochloric acid R1*, add 20 mL of chelating solution, 2.7 mL of *glacial acetic acid R* and 2.8 g of *sodium chloride R*, adjust to pH 5-6 with *sodium hydroxide solution R* and dilute to 50.0 mL with *water R*.

Reference solution. Dissolve 4.42 g of *sodium fluoride R*, previously dried at 300 °C for 12 h, in *water R* and dilute to 1000.0 mL with the same solvent. Dilute 50.0 mL of this solution to 500.0 mL with *total-ionic-strength-adjustment buffer R* (200 ppm F).

Indicator electrode: fluoride-selective.

Reference electrode: silver-silver chloride.

Carry out the measurement on 20.0 mL of the test solution. Add at least 3 times 0.10 mL of the reference solution and carry out the measurement after each addition. Calculate the concentration of fluorides using the calibration curve.

Sulfates: maximum 0.5 per cent.

Test solution. Dissolve 0.5 g in a mixture of 5 mL of *water R* and 5 mL of *dilute hydrochloric acid R* and dilute to 100 mL with *water R*. Filter if necessary. To 20 mL of this solution, add 1 mL of *dilute hydrochloric acid R* and dilute to 50 mL with *water R*.

Reference solution. To 1.0 mL of *0.005 M sulfuric acid*, add 1 mL of *dilute hydrochloric acid R* and dilute to 50 mL with *water R*. Filter if necessary.

To the test solution and to the reference solution, add 2 mL of a 120 g/L solution of *barium chloride R* and allow to stand for 10 min. Any opalescence in the test solution is not more intense than that in the reference solution.

Arsenic (*2.4.2, Method A*): maximum 10 ppm, determined on 2 mL of solution S.

Barium. To 0.5 g, add 10 mL of *water R* and heat to boiling. While stirring, add 1 mL of *hydrochloric acid R* dropwise. Allow to cool and filter if necessary. Add 2 mL of a 10 g/L solution of *dipotassium sulfate R* and allow to stand for 10 min. No turbidity is produced.

Iron (*2.4.9*): maximum 400 ppm.

Dilute 0.5 mL of solution S to 10 mL with *water R*.

Loss on ignition: 6.6 per cent to 8.5 per cent, determined on 1.000 g to constant mass at 800-825 °C.

ASSAY

Dissolve 0.4 g in 12 mL of *dilute hydrochloric acid R* by heating on a water bath if necessary and dilute to 200 mL with *water R*. To 20.0 mL of this solution add 25.0 mL of *0.02 M sodium edetate*, 50 mL of *water R*, 5 mL of *ammonium chloride buffer*