POTASSIUM POLYPHOSPHATES

Prepared at the 26th JECFA (1982), published in FNP 25 (1982) and in FNP 52 (1992). Metals and arsenic specifications revised at the 61st JECFA (2003). No ADI was established, but a group MTDI of 70 mg/kg bw, expressed as phosphorus from all food sources, was established at the 26th JECFA (1982).

SYNONYMS Potassium metaphosphate; INS No 452(ii)

DEFINITION A heterogeneous mixture of potassium salts of linear condensed polyphosphoric acids of general formula $H_{n+2}P_nO_{3n+1}$ where "n" is not less than 2

Chemical names: Potassium metaphosphate, potassium polymetaphosphate, potassium polyphosphate

C.A.S. number: 7790-53-6

Assay: Not less than 53.5% and not more than 61.5% of P_2O_5 on the ignited basis

DESCRIPTION Odourless, colourless or white glassy masses, fragments, crystals or powder

FUNCTIONAL USES Emulsifier, moisture-retaining agent, sequestrant, texturizer

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4): 1 g dissolves in 100 ml of a 1 in 25 soln of sodium acetate

Gel formation: Finely powder about 1 g of the sample, and add it slowly to 100 ml of a 1 in 50 solution of sodium chloride while stirring vigorously. A gelatinous mass is formed.

Test for potassium (Vol. 4): Mix 0.5 g of the sample with 10 ml of nitric acid and 50 ml of water, boil for about 30 min, and cool. The resulting solution is used for the test

Test for phosphate (Vol. 4): Mix 0.5 g of the sample with 10 ml of nitric acid and 50 ml of water, boil for about 30 min and cool. The resulting solution is used for the test

PURITY

Loss on ignition (Vol. 4): Not more than 2 % after drying (105°, 4 h) followed by ignition at 550° for 30 min

Cyclic phosphate (Vol. 4): Not more than 8.0%

Fluoride: Not more than 10 mg/kg
See description under TESTS

Arsenic (Vol. 4) — Not more than 3 mg/kg (Method II)

Lead (Vol. 4) — Not more than 4 mg/kg
Determine using an atomic absorption technique appropriate to the specified level. The selection of sample size and method of sample preparation may be based on the principles of the method described in Volume 4, “Instrumental Methods.”

TESTS

PURITY TESTS

Fluoride

Place 5 g of the sample, 25 ml of water, 50 ml of perchloric acid, 5 drops of silver nitrate solution (1 in 2), and a few glass beads in a 250-ml distilling flask connected with a condenser and carrying a thermometer and capillary tube, both of which must extend into the liquid. Connect a small dropping funnel, filled with water, or a steam generator to the capillary tube. Support the flask on an asbestos mat with a hole which exposes about one-third of the flask to the flame. Distil into a 250-ml flask until the temperature reaches 135°.

Add water from the funnel or introduce steam through the capillary to maintain the temperature between 135° and 140°. Continue the distillation until 225-240 ml has been collected, then dilute to 250 ml with water, and mix.

Place a 50-ml aliquot of this solution in a 100-ml Nessler tube. In another similar Nessler tube place 50 ml of water as a control. Add to each tube 0.1 ml of filtered solution of sodium alizarinsulfonate (1 in 1,000) and 1 ml of freshly prepared hydroxylamine hydrochloride solution (1 in 4,000), and mix well. Add, dropwise, and with stirring, 0.05 N sodium hydroxide to the tube containing the distillate until its colour just matches that of the control, which is faintly pink. Then add to each tube exactly 1 ml of 0.1 N hydrochloric acid, and mix well. From a buret, graduated in 0.05-ml, add slowly to the tube containing the distillate enough thorium nitrate solution (1 in 4,000) so that, after mixing, the colour of the liquid just changes to a faint pink. Note the volume of the solution added, add exactly the same volume to the control, and mix. Now add to the control sodium fluoride TS (10 µg F per ml) from a buret to make the colours of the two tubes match after dilution to the same volume. Mix well, and allow all air bubbles to escape before making the final colour comparison. Check the end-point by adding 1 or 2 drops of sodium fluoride TS to the control. A distinct change in colour should take place. Note the volume of sodium fluoride added. The volume of sodium fluoride TS required for the control solution should not exceed 1.0 ml.

METHOD OF ASSAY

Mix about 300 mg of the sample, accurately weighed, with 15 ml of nitric acid and 30 ml of water, boil for 30 min, and dilute with water to about 100 ml. Heat at 60°, add an excess of ammonium molybdate TS, and heat at 50° for 30 min. Filter, and wash the precipitate with dilute nitric acid (1 in 36 soln), followed by potassium nitrate solution (1 in 100 soln) until the filtrate is no longer acid to litmus. Dissolve the precipitate in 50 ml of 1 N sodium

hydroxide, add phenolphthalein TS, and titrate the excess sodium hydroxide with 1 N sulfuric acid. Each ml of 1 N sodium hydroxide is equivalent to 3.086 mg of P_2O_5.