

TETRAPOTASSIUM PYROPHOSPHATE

Prepared at the 24th JECFA (1980), published in FNP 17 (1980) and in FNP 52 (1992). Metals and arsenic specifications revised at the 55th JECFA (2000). A group MTDI of 70 mg/kg bw, as phosphorus from all food sources, was established at the 26th JECFA (1982)

SYNONYMS Tetrapotassium diphosphate, potassium pyrophosphate; INS No. 450(v)

DEFINITION

Chemical names Tetrapotassium diphosphate, tetrapotassium pyrophosphate, tetrapotassium salt of diphosphoric acid

C.A.S. number 7320-34-5

Chemical formula $K_4P_2O_7$

Formula weight 330.34

Assay Not less than 95% on the ignited basis

DESCRIPTION Colourless or white crystals, or a white crystalline or granular powder, powder of granular solid; hygroscopic

FUNCTIONAL USES Emulsifier, texturizer

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Soluble in water; insoluble in ethanol

pH (Vol. 4) 10.0 - 10.7 (1 in 100 soln)

Test for phosphate (Vol. 4) Passes test

Test for potassium (Vol. 4) Passes test

PURITY

Loss on ignition (Vol. 4) Not more than 2% (105°, 4 h; then 550°, 30 min)

Water insoluble matter (Vol. 4) Not more than 0.2%

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

Dissolve about 600 mg of the sample, accurately weighed, in 100 ml of water in 400-ml beaker, and adjust the pH of the solution to exactly 3.8 with hydrochloric acid, using a pH meter. Add 50 ml of a 1 in 8 solution of zinc sulfate (125 g of $ZnSO_4 \cdot 7H_2O$ dissolved in water, diluted to 1000 ml, filtered, and adjusted to pH 3.8) and allow to stand for 2 min. Titrate the liberated acid with 0.1 N sodium hydroxide until a pH of 3.8 is again reached. After each addition of sodium hydroxide near the end-point, time should be allowed for any precipitated zinc hydroxide to redissolve. Each ml of 0.1 N sodium hydroxide is equivalent to 16.52 mg of $K_4P_2O_7$.