TRIPOTASSIUM PHOSPHATE

Prepared at the 19th JECFA (1975), published in NMRS 55B (1976) and in FNP 52 (1992). Metals and arsenic specifications revised at the 59th JECFA (2002). A group MTDI of 70 mg/kg bw, as phosphorus from all food sources, was established at the 26th JECFA (1982)

SYNONYMS

Tribasic potassium phosphate, potassium phosphate; INS No. 340(iii)

DEFINITION

Chemical names	Tripotassium phosphate, tripotassium orthophosphate, tripotassium monophosphate
C.A.S. number	7778-53-2
Chemical formula	Anhydrous: K_3PO_4 Hydrated: $K_3PO_4 \cdot xH_2O$
Formula weight	212.27 (anhydrous)
Assay	Not less than 97.0% of K_3PO_4, calculated on the ignited basis

DESCRIPTION

Colourless or white, odourless hygroscopic crystals or granules; hydrated forms available include the monohydrate and trihydrate

FUNCTIONAL USES

Buffer, emulsion stabilizer, sequestrant

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)	Freely soluble in water; insoluble in ethanol
pH (Vol. 4)	11.5 - 12.5 (1 in 100 soln)
Test for potassium	To a 1 in 100 solution of the sample add 1 volume of saturated sodium hydrogen tartrate solution and 1 volume of ethanol and shake. A white crystalline precipitate is formed.
Test for phosphate	To 5 ml of a 1 in 100 solution of the sample add 1 ml of concentrated nitric acid and 5 ml of ammonium molybdate TS and warm. A bright canary-yellow precipitate is obtained.
Test for orthophosphate	Dissolve 0.1 g of the sample in 10 ml water, acidify slightly with dilute acetic acid TS, and add 1 ml of silver nitrate TS. A yellow precipitate is formed.

PURITY

Loss on ignition (Vol. 4)	Anhydrous: Not more than 3% (120°, 2 h, then 800°, 30 min) Hydrated: Not more than 23% (120°, 2 h, then 800°, 30 min)

Water insoluble substances (Vol. 4)	Not more than 0.2%
Fluoride (Vol. 4)	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 a 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^o. Add water from the funnel or introduce steam through the capillary to maintain the temperature between 135^o and 140^o. 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 a filtered solution of sodium alizarinsulfonate (1 in 1000) and 1 ml of freshly prepared hydroxylamine solution (1 in 4000), 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 4000) 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 ml.

METHOD OF ASSAY

Dissolve an accurately weighed quantity of the sample, equivalent to about 8 g of anhydrous K_3PO_4, in 40 ml of water in a 400-ml beaker, and add 100 ml of 1 N hydrochloric acid. Pass a stream of carbon dioxide free air, in fine bubbles, through the solution for 30 min to expel carbon dioxide, covering the beaker loosely to prevent loss by spraying. Wash the cover and sides of the beaker with a few ml of water, and place the electrodes of a suitable pH meter in the solution. Titrate the solution with 1 N sodium hydroxide to the inflection point occurring at about pH 4, then calculate the volume (A) of 1 N hydrochloric acid consumed. Protect the solution from absorbing carbon dioxide from the air, and continue the titration with 1 N sodium hydroxide until the inflection point occurring at about pH 8.8 is reached. Calculate the volume (B) of 1 N sodium hydroxide consumed in this titration. When (A) is equal to, or greater than, 2(B), each ml of the volume (B) of 1 N sodium hydroxide is equivalent to 212.3 mg of K_3PO_4. When (A) is less than 2(B), each ml of the volume (A) - (B) of 1 N sodium hydroxide is equivalent to 212.3 mg of K_3PO_4.