

DIPOTASSIUM HYDROGEN 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

Dibasic potassium phosphate, dipotassium monophosphate, dipotassium phosphate, dipotassium acid phosphate, secondary potassium phosphate; INS No. 340(ii)

DEFINITION

Chemical names Dipotassium hydrogenphosphate, dipotassium hydrogen orthophosphate, dipotassium hydrogen monophosphate

C.A.S. number 7758-11-4

Chemical formula K_2HPO_4

Formula weight 174.18

Assay Not less than 98.0% after drying

DESCRIPTION Colourless or white granular powder, crystals or masses; deliquescent

FUNCTIONAL USES Buffering agent, sequestrant, yeast food

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4) Freely soluble in water, insoluble in ethanol

pH (Vol. 4) 8.7-9.3 (1 in 100 soln)

Test for potassium (Vol. 4) Passes test

Test for phosphate (Vol. 4) Passes test

Test for orthophosphate (Vol. 4) 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 drying (Vol. 4) Not more than 5% (105°, 4 h)

Water insoluble substances (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

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°. 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 a filtered solution of sodium alizarinsulfonate (1 in 1000) and 1 ml of freshly prepared hydroxylamine solution (1 in 4000), and mix well. Add, drop wise, 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

Into a 250-ml beaker transfer about 6.5 g of the dried sample, accurately weighed. Add 50 ml of 1 N hydrochloric acid and 50 ml of water, and stir until the sample is completely dissolved. Place the electrodes of a suitable pH meter in the solution and titrate the excess acid with 1N sodium hydroxide to the inflection point occurring at about pH 4. Record the buret reading and calculate the volume (A) of 1N hydrochloric acid consumed by the sample. Continue the titration with 1N sodium hydroxide until the inflection point occurring at about pH 8.8 is reached, record the buret reading, and calculate the volume (B) of 1 N sodium hydroxide required in the titration between the two inflection points (pH 4 to pH 8.8). When (A) is

equal to, or less than, (B), each ml of the volume (A) of 1N hydrochloric acid is equivalent to 174.2 mg of K_2HPO_4 . When (A) is greater than (B), each ml of the volume $2(B) - (A)$ of 1N sodium hydroxide is equivalent to 174.2 mg of K_2HPO_4 .