TRISODIUM 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 sodium phosphate, sodium phosphate; INS No. 339(iii)

DEFINITION

Chemical names: Trisodium orthophosphate, trisodium phosphate, trisodium monophosphate

C.A.S. number: 7601-54-9

Chemical formula: Anhydrous: Na_3PO_4
Hydrated: $Na_3PO_4 \cdot xH_2O$

Formula weight: Anhydrous: 163.94

Assay: Anhydrous, hemihydrate and monohydrate: Not less than 97.0% calculated on the dried basis
Dodecahydrate: Not less than 92.0% calculated on the ignited basis

DESCRIPTION White odourless crystals, granules or a crystalline powder; hydrated forms available include hemi- and monohydrates, hexahydrate, octahydrate, decahydrate and dodecahydrate; the dodecahydrate contains 1/4 mol of sodium hydroxide.

FUNCTIONAL USES Buffer, sequestrant, emulsion stabilizer

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 sodium: To 5 ml of a 1 in 20 solution of the sample add 1 ml of acetic acid TS and 1 ml of uranyl zinc acetate TS. A yellow crystalline precipitate is formed within a few min.

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 2% (120^o, 2 h, then 800^o, 30 min) Monohydrate: Not more than 11% (120^o, 2 h, then 800^o, 30 min) Dodecahydrate: 45-58% (120^o, 2 h, then 800^o, 30 min)
Water insoluble substances (Vol. 4)	Not more than 0.2%
Fluoride (Vol. 4)	Not more than 50 mg/kg (Method I or III)
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."

METHOD OF ASSAY

Dissolve an accurately weighed quantity of the sample, equivalent to between 5.5 and 6 g of anhydrous Na_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 the titration. When (A) is equal to, greater than, 2(B), each ml of the volume (B) of 1 N sodium hydroxide is equivalent to 163.9 mg of Na_3PO_4. When (A) is less than 2(B), each ml of the volume (A) - (B) of 1 N sodium hydroxide is equivalent to 163.9 mg of Na_3PO_4.