SODIUM DIHYDROGEN PHOSPHATE

Prepared at the 7th JECFA (1963), published in NMRS 35 (1964) 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 Monobasic sodium phosphate, monosodium monophosphate sodium acid phosphate, sodium biphosphate; INS No. 339(i)

DEFINITION

Chemical names	Sodium dihydrogenphosphate, monosodium dihydrogenortho- phosphate, monosodium dihydrogen monophosphate
C.A.S. number	7558-80-7
Chemical formula	Anhydrous: NaH_2PO_4 Monohydrate: $NaH_2PO_4 \cdot H_2O$ Dihydrate: $NaH_2PO_4 \cdot 2H_2O$
Formula weight	Anhydrous: 119.98 Monohydrate: 138.00 Dihydrate: 156.01
Assay	Not less than 97% after drying

DESCRIPTION White odourless, slightly deliquescent powder, crystals, or granules

FUNCTIONAL USES Acidity regulator, sequestrant

CHARACTERISTICS

IDENTIFICATION

Solubility (Vol. 4)	Freely soluble in water; insoluble in ethanol, ether or chloroform
pH (Vol. 4)	4.2 - 4.6 (1 in 100 soln)
Test for sodium (Vol. 4)	Passes test
Test for phosphate (Vol. 4)	Passes test
Test for orthophosphate	To a 1% solution of the sample add silver nitrate TS; the yellow precipitate formed is soluble in dilute nitric acid TS.

PURITY

Loss on drying (Vol. 4)	Anhydrous: Not more than 2% (60^o, 1 h, then 105^o, 4 h) Monohydrate: Not more than 15% (60^o, 1 h, then 105^o, 4 h) Dihydrate: Not more than 25% (60^o, 1 h, then 105^o, 4 h)
Free acid and disodium	2.00 g of the sample dissolved in 40 ml of water require for neutralization

phosphate	not more than 0.3 ml of either N sodium hydroxide or N sulfuric acid, using methyl orange TS as indicator.
Fluoride (Vol. 4)	Not more than 10 mg/kg
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

Transfer 0.7000 g of the dried sample to a 250-ml beaker, add 50 ml of 0.1 N hydrochloric acid, and stir until the sample is completely dissolved. Place the electrodes of a suitable pH meter in the solution and add slowly from a burette, with constant stirring, 0.1 N sodium hydroxide until a pH of 3.3 is attained. Continue to add sodium hydroxide solution until the next ml or 0.5-ml graduation mark on the burette is reached. Record the burette reading under column 1 of a suitable data sheet and record the pH under column 2. Continue the addition of 0.1 N sodium hydroxide in 0.5-ml increments until a pH of 6.0 is attained, recording the burette reading and the pH after the addition of each increment. Then proceed with the titration in the usual manner until a pH of 0.8 is attained, and again continue to add the solution until the next ml or 0.5-ml graduation mark is reached before recording the burette reading and the pH. Then continue adding 0.1 N sodium hydroxide in 0.5-ml increments until the pH is 10.0, again recording the burette reading and the pH after the addition of each increment. In column 3 of the data sheet, note the values for "delta"pH obtained by subtracting each pH value recorded from the net higher value. In column 4, note the values for "delta"$_2$pH, i.e., the differences between successive "delta"pH values, recording them as plus or minus depending upon whether the value of "delta"pH is higher or lower than the preceding one. The end-point lies in the 0.5-ml increment of sodium hydroxide that gives the highest value for "delta"pH, its exact position being calculated by adding 0.5 b/B to the next lower burette reading, where b is the last "delta"$_2$pH value having a plus sign and B is the sum, without regard to sign, of the last "delta"$_2$pH value having a plus sign and the first "delta"$_2$pH value having a minus sign. Two end-points are calculated, that occurring between pH 3.3 and pH 6.0 being designated F and that between pH 8.5 and pH 10.0 being designated T. The volume of sodium hydroxide used in the titration is obtained by subtracting F from T. Each ml of 0.1 N sodium hydroxide is equivalent to 0.0120 g of NaH_2PO_4.