



>>>Entry Name: Sodium phosphate (Na₃PO₄)

ENTRY UNDER REVIEW

Synonym(s): Trisodium phosphate, 9CI, 8CI. Sodium orthophosphate

CAS Registry Number: 7601-54-9

Related CAS Registry Numbers(s): 10361-89-4 15819-50-8

Na₃PO₄

Molecular Formula: Na₃O₄P

Molecular Weight: 163.94

Accurate Mass: 163.922723

Percentage Composition: Na 42.07%; O 39.04%; P 18.89%

Source/Synthesis: Synth. from solid state reactions eg. Na₄P₂O₇ + Na₂CO₃ at 800°; Na₂HPO₄ + Na₂CO₃ at 600° which provide the high temp. form initially

Use/Importance: Employed as a cleaning and degreasing agent in metal-coating processes, and in electroplating; also as a corrosion inhibitor. Used as a food additive, and in photographic processes and buffer compositions

Physical Description: Colourless cryst.

Melting Point: Mp 1583°

Solubility: Sol. H₂O (14.5 g per 100 cm³ at 25°; 95 g per 100 cm³ at 100°)

Other Data: Aq. solns. are alkaline. ΔH_f° -1917 kJ mol⁻¹; ΔG_f° -1789 kJ mol⁻¹; S° 174 J K⁻¹ mol⁻¹

Aldrich: 34248-3

Fluka: 71904

>>>Derivative: Hemihydrate

CAS Registry Number: 60593-58-0

Source/Synthesis: Synth. from AlPO₄ + NaOH; also by dehydration of other hydrates at relatively low temp.

Physical Description: Stout prisms, cryst. from aq. soln. at Bp

Melting Point: Mp 180°

Other Data: Monoclinic lattice, possessing 3-D network of distorted NaO₆ octahedra and PO₄ tetrahedra

>>>Derivative: Monohydrate

CAS Registry Number: 27176-08-5

Other Data: Of doubtful existence

>>>Derivative: Hexahydrate

CAS Registry Number: 15819-50-8

Physical Description: Cryst. (H₂O at >86°)

Melting Point: Mp 110°

Fluka: 71906

>>>Derivative: Octahydrate

CAS Registry Number: 60593-59-1

Source/Synthesis: Synth. from hexahydrate with sl. excess H₂O

Melting Point: Mp 86°

Other Data: Triclinic lattice. Na ions are hexacoord. PO₄ tetrahedra have OPO 108.2-110.2°, P-O 153.3-154.4 pm

>>>Derivative: Dodecahydrate

CAS Registry Number: 10101-89-0

Source/Synthesis: A true dodecahydrate said to be formed by the hydration (H₂O vap.) of the product from Na₂CO₃ + Sodium diphosphate (Na₄(P₂O₇)) [HTW34-S](#) at 600°.

Physical Description: Colourless cryst.

Melting Point: Mp 73.3-76.7° (dec.)

Solubility: V. sol. H₂O (157 g per 100 cm³ at 70°)

Other Data: Readily loses 4H₂O at 15°, and further 2H₂O at 26°, and yields a hemihydrate at 36-37°. The pseudo-dodecahydrate contains structural NaOH and is better represented as 4Na₃PO₄.48H₂O.NaOH, and loses 4H₂O at 26°. ΔH_f° -5477 kJ mol⁻¹. Several further hydrates have been claimed

Aldrich: 22200-3

Fluka: 71909

Sigma: S7778