



>>Entry Name: Phosphoric acid, 9CI, 8CI, USAN

ENTRY UNDER REVIEW

Synonym(s): Orthophosphoric acid. Trihydroxo oxophosphorus(*P*)

CAS Registry Number: 7664-38-2

Related CAS Registry Numbers(s): 14066-19-4 14066-20-7 14335-33-2 39456-59-2

$(\text{HO})_3\text{P}=\text{O}$

Molecular Formula: $\text{H}_3\text{O}_4\text{P}$

Molecular Weight: 97.995

Accurate Mass: 97.976897

Percentage Composition: H 3.09%; O 65.31%; P 31.61%

Source/Synthesis: Normally manuf. by burning P to P_4O_{10} and dissolving the latter in H_2O ('dry' process) or from phosphate minerals (e.g. apatite) by treatment with H_2SO_4 ('wet' process). Also obt. by action of other strong oxidants e.g. HNO_3 on white P

Use/Importance: Used mostly in the manuf. of fertilisers and phosphate detergents. Other uses include the manuf. of other P chemicals, electropolishing and electroplating, refractory binders, dental and other commercial cements. The acid also acts as a catalyst for many reactions e.g. dehydration of alcohols and many hydrocarbon conversion processes. Important industrial chemical, USA production in 1999 13.76 million tons. Masking agent for Fe(*III*), component of buffers. Dental etching agent

Biological Use/Importance: Dilute solns. used to control nausea and vomiting

Physical Description: Colourless cryst. or syrup

Melting Point: Mp 42.3°

Solubility: Misc. H_2O , many org. solvs.

Density: d 1.864

pKa Value: $\text{p}K_{\text{a}1}$ 2.15; $\text{p}K_{\text{a}2}$ 7.2; $\text{p}K_{\text{a}3}$ 12.4 (H_2O)

Refractive Index: n_{D}^{20} 1.4503

Other Data: Melts to a syrup and may be supercooled to a glass which yields a second cryst. form at -54°, reverting at -6° to the form stable at r.t. Complexes with a wide variety of compds. e.g. ketones and ethers. When heated strongly partial dehydration → Diphosphoric acid [HTV84-C](#)

Hazard & Toxicity: OES: long-term 1 mg m⁻³; short-term 3 mg m⁻³. Eye, skin and respiratory tract irritant. Conc. solns. corrosive. LD₅₀ (rat, orl) 1530 mg/kg

Aldrich: 43808-1

Fluka: 79622

Sigma: P6560

>>Derivative: Hemihydrate

Physical Description: Colourless deliquescent prisms

Melting Point: Mp 29.3°

Solubility: V. sol. H_2O

Other Data: Melts to a syrup which can be supercooled to a glass. Cryst. contain H-bonded network of H_3PO_4 and H_2O molecules (2:1). Monoclinic lattice

>>Derivative: Hydrazine salt (1:1)

Molecular Formula: $\text{H}_7\text{N}_2\text{O}_4\text{P}$

Molecular Weight: 130.04

Accurate Mass: 130.014345

Percentage Composition: H 5.43%; N 21.54%; O 49.21%; P 23.82%

Physical Description: Colourless cryst. (EtOH aq.)

Other Data: Orthorhombic cell

>>Derivative: Hydrazine salt (2:1)

Molecular Formula: $\text{H}_{10}\text{N}_2\text{O}_8\text{P}_2$

Molecular Weight: 228.035

Accurate Mass: 227.991242

Percentage Composition: H 4.42%; N 12.28%; O 56.13%; P 27.17%

Physical Description: Colourless cryst.

Other Data: Monoclinic cell

>>Derivative: Cyclohexylammonium salt (1:1)

Physical Description: Colourless needle-shaped cryst.

Melting Point: Mp 150-152°

Solubility: Sol. H_2O (16 g per 100 g)