



>>>**Entry Name:** Phosphorus nitride (P_3N_5), 9Cl, 8Cl

Synonym(s): Triphosphorus pentanitride

CAS Registry Number: 12136-91-3

P_3N_5

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

Source/Synthesis: Synth. from Phosphoryl nitride [HTK47-Q](#) + NH_3 at 870°; PH_3 + NH_3 in N_2 at 860-900°; $\text{P}_4(\text{NH})_6$ heated to 850-900° in NH_3

Physical Description: Air-stable white odourless solids

Solubility: Insol. acids, bases and all common solvs.

Other Data: Dec. by heat and light into P + N_2 . With H_2O at 180°r H_3PO_4 + NH_3

>>>**Variant:** Amorphous-form

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

Source/Synthesis: Synth. from P + N_2 , or PH_3 + N_2

>>>**Variant:** α -form

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

atoms and the remaining N atoms are bridging 2 P atoms

Source/Synthesis: Obt. from amorphous form + NH_3 at 800-900°, or by thermol. of $[\text{P}(\text{NH}_2)_4]\text{I}$ at 825°

Physical Description: Beige cryst., stable at r.t.

Solubility: Insol. all common solvs.

Other Data: Resistant to hot acids and alkaline solns.

>>>**Variant:** β -form

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

Physical Description: Cryst., stable at r.t.

>>>**Variant:** γ -form

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

Source/Synthesis: Synth. from α -form in NH_3 at 500° and 40 atm.

>>>**Variant:** δ -form

Molecular Formula: N_5P_3

Molecular Weight: 162.955

Accurate Mass: 162.936656

Percentage Composition: N 42.98%; P 57.02%

2 P atoms; α - and β - P_3N_5 forms distinguished; these are differentiated only by stacking order of identical sheets

Source/Synthesis: Synth. from $(\text{PNCl}_2)_3$ + NH_4Cl at 497-777°

Use/Importance: First report of unique binary struct. type, combining tetrahedral struct. with very rare 3:5 molar ratio of constituent elements

Physical Description: Ai- and moisture-stable, fine crystalline colourless powder

Solubility: Insol. acids, bases, org. solvs.

Other Data: H- and O-free, crystalline and stoichiometric form; thermal degradation begins at $T > 825^\circ$, leading to N_2 , PN and P_4