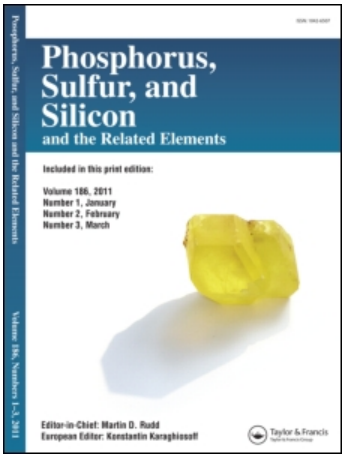

Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

Tetraphosphorus Trisulfide in the Synthesis of Organothiophosphorus Compounds

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To cite this Article Nizamov, I. S. , Trusenev, A. G. , Al'fonsov, V. A. , Batyeva, E. S. , Pudovik, A. I. J. and Kbuzov, A. E.(1990) 'Tetraphosphorus Trisulfide in the Synthesis of Organothiophosphorus Compounds', Phosphorus, Sulfur, and Silicon and the Related Elements, 51: 1, 217
To link to this Article: DOI: 10.1080/10426509008040751
URL: http://dx.doi.org/10.1080/10426509008040751

Phosphorus, Sulfur, and Silicon, 1990, Vols. 51/52, p. 217
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TETRAPHOSPHORUS TRISULFIDE IN THE SYNTHESIS OF ORGANOTHIOPHOSPHORUS COMPOUNDS

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The investigations of the reactions of lower phosphorus sulfides with organic substances can result in novel non-traditional methods of the synthesis of organophosphorus compounds. Tetraphosphorus trisulfide was proved to react with thioacetals, to give addition products of the α-alkylthioalkyl thionphosphonate structure and tetrathiophosphates.

$$P_4S_3 + (RS)_2CR'R'' \rightarrow (RS)_2\overset{\overset{S}{\|}}{P}\text{-}\overset{\overset{SR}{|}}{C}R'R'' + \underset{\underset{S\text{-}C(SR)R'R''}{|}}{RP}(S)C(SR)R'R'' + (RS)_3\overset{\overset{S}{\|}}{P}$$

The reaction with aminals of formaldehyde proceeds under milder conditions and results in α-aminoalkyl thionphosphonates.

$$P_4S_3 + (R_2N)_2CH_2 \rightarrow (R_2N)_2P(S)CH_2NR_2$$

The interaction of tetraphosphorus trisulfide with disulfides and sulfenamides proves a convenient method for the preparation of tetrathiophosphates and non-symmetrical mixed amidothiophosphates.

$$P_4S_3 + 6RS\text{-}SR \rightarrow (RS)_3P + 3(RS)_3P{=}S$$

$$P_4S_3 + RS\text{-}NR_2 \rightarrow (RS)_2P(S)NR'_2 + RSP(S)(NR'_2)_2$$

Reactions with aminals, disulfides and sulfenamides are catalyzed by amines.