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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>

Formation of Some New Four-Memberd Phosphorus-Nitrogen and Phosphorus-Nitrogen-Sulfur Ring Systems

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To cite this Article Donath, C. and Meisel, M.(1990) 'Formation of Some New Four-Memberd Phosphorus-Nitrogen and Phosphorus-Nitrogen-Sulfur Ring Systems', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 51: 1, 471

To link to this Article: DOI: 10.1080/10426509008040995

URL: <http://dx.doi.org/10.1080/10426509008040995>

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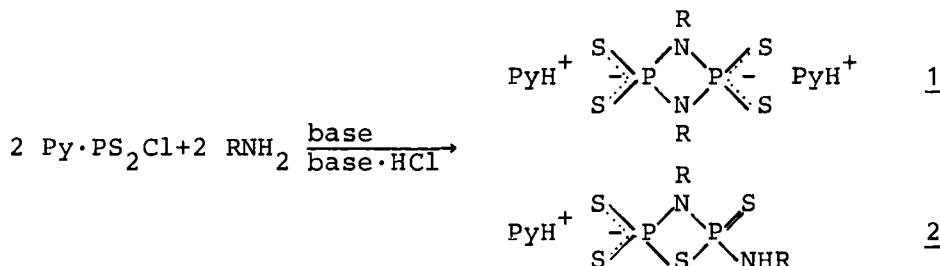
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FORMATION OF SOME NEW FOUR-MEMBERED PHOSPHORUS-NITROGEN AND PHOSPHORUS-NITROGEN-SULFUR RING SYSTEMS

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Continuing the study on the course of reaction of $\text{Py} \cdot \text{PS}_2\text{Cl}$ with primary amines we have found a method to prepare the hitherto unknown tetrathio-substituted phosphetidine compounds 1 and 2. Primary amines react with $\text{Py} \cdot \text{PS}_2\text{Cl}$ in a molar ratio of 1:1 in the presence of a base either to diazaphosphetidines 1 or to azathiaphosphetidines 2 according to equation (1):



With unsubstituted and ortho-substituted aromatic amines and also aminosubstituted heterocyclic compounds the formation of 1 is preferred.

An increasing sterical hindrance like in 2,6-di- and 2,4,6-trisubstituted anilines favours the arrangement to an azathia-ring system 2. In the same way as the sterical hindered aromatic amines the corresponding aliphatic ones like $t\text{-BuNH}_2$ and $i\text{-PrNH}_2$ react to 2.

With unbranched aliphatic amines both ring systems can be formed depending on the base used. In general the presence of a weak base (pyridine) results in P_2NS -ring and a strong base (NEt_3) in P_2N_2 -ring formation.

In some cases both types of compounds are yielded in the reaction mixture. But normally one ring system is preferred and the reaction conditions can be chosen in that way only one compound is formed.