

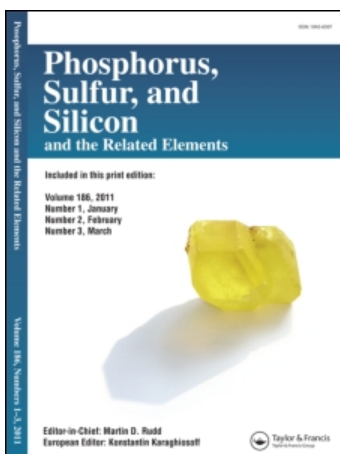
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## Phosphorus, Sulfur, and Silicon and the Related Elements

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### Investigations of Compounds Containing the Four-Membered $\text{PN}_2\text{Te}$ and $\text{Te}_2\text{N}_2$ Rings

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## INVESTIGATIONS OF COMPOUNDS CONTAINING THE FOUR-MEMBERED $\text{PN}_2\text{Te}$ AND $\text{Te}_2\text{N}_2$ RINGS: A DIMER OF A TELLURIUM DIIMIDE

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T2N 1N4

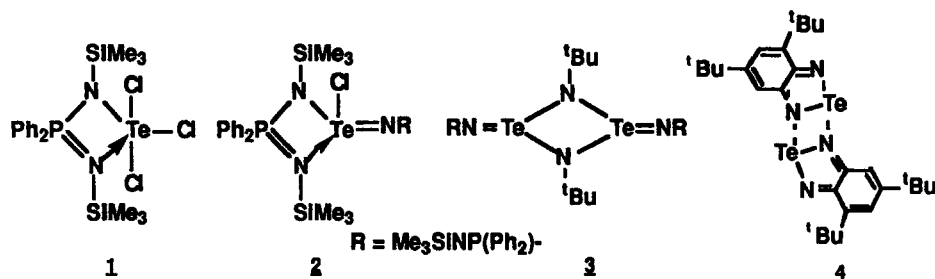
**Abstract** The preparation and structures of compounds containing four-membered  $\text{PN}_2\text{Te}$  rings, a dimer of tellurium diimide, and a telluradiazole are described.

### INTRODUCTION

The cyclocondensation reaction of  $\text{Ph}_2\text{PN}_2(\text{SiMe}_3)_3$  with (i) sulfur or selenium halides (ii)  $\text{RSeCl}_3$  gives rise to eight-membered rings of the type  $\text{Ph}_4\text{P}_2\text{N}_4\text{E}_2$  ( $\text{E} = \text{S}, \text{Se}$ ) or  $\text{Ph}_4\text{P}_2\text{N}_4\text{Se}_2\text{R}_2$  ( $\text{R} = \text{Me}, \text{Et}, \text{Ph}$ ), respectively.<sup>1</sup> By contrast, the treatment of this reagent with  $\text{ArTeCl}_3$  produces  $\text{Ph}_2\text{P}(\text{NSiMe}_3)_2\text{TeCl}_2\text{Ar}$  identified as four-membered rings on the basis of NMR spectroscopic data.<sup>2</sup>

Tellurium diimides, like the sulfur and selenium analogues, are an important class of compounds. However, the only reported examples are the insoluble compounds formulated  $\text{RN}=\text{Te}=\text{NR}$  ( $\text{R} = \text{CH}_3\text{CO}, \text{C}_6\text{H}_5\text{SO}_2, \text{p-CH}_3\text{C}_6\text{H}_5\text{SO}_2$ ) on the basis of elemental analysis.<sup>3</sup>

In this contribution the preparation and X-ray structures of the telluradiazaphosphetidines **1** and **2**, the tellurium diimide dimer **3** and the telluradiazole **4** will be described.



### PREPARATION AND STRUCTURES OF 1 AND 2

The reaction of  $\text{TeCl}_4$  with  $[\text{Ph}_2\text{P}(\text{NSiMe}_3)_2]\text{Li}$  in  $\text{CH}_2\text{Cl}_2$  resulted in the formation of **1** in quantitative yield. A similar reaction, but in a molar ratio of 1:2, produced **2** in 92% yield.

The geometry at Te in **1** is a distorted square pyramid, while in **2** it is a distorted trigonal pyramid. Both **1** and **2** have a four-membered  $\text{PN}_2\text{Te}$  ring. In both cases, one endocyclic Te-N bond is substantially longer than the other. In **2**, the Te-exocyclic nitrogen bond is quite short (1.90 Å) and is represented as  $\text{Te}=\text{N}$  double bond.<sup>4</sup> This bond is almost perpendicular to the plane defined by Te and the two cyclic nitrogen atoms.

### PREPARATION AND STRUCTURES OF 3 AND 4

The reaction of **2** with  ${}^t\text{BuNHLi}$  in toluene produced **3** in almost quantitative yield. The by-product was proved by  ${}^{31}\text{P}$  NMR to be  $\text{Ph}_2\text{P}(\text{NSiMe}_3)(\text{NHSiMe}_3)$ , (**5**). The formation of **3** is proposed to occur via the replacement of Cl by  ${}^t\text{BuNH}$  followed by the elimination of **5** to produce  ${}^t\text{BuN}=\text{Te}=\text{NR}$ , which dimerizes to give **3**.

The dimer **3** has a  $\text{Te}_2\text{N}_2$  ring with two  ${}^t\text{BuN}$  groups bridging the two Te atoms. The geometry at the bridging nitrogens is nearly planar. The two  $\text{Te}=\text{N}$  double bonds are almost perpendicular to the  $\text{TeN}_2$  planes and are trans to each other.

The telluradiazole **4** is produced from the reaction of 2, 4, 6- ${}^t\text{Bu}_3\text{C}_6\text{H}_2\text{NHLi}$  with **2**. The dimeric structure of **4** was established by X-ray crystallography. There is a quite strong intermolecular interaction between Te and N ( $d(\text{Te}-\text{N}) = 2.628 \text{ \AA}$ ) as found previously for other telluradiazoles.<sup>5</sup>

### REFERENCES

1. T. Chivers, D. D. Doxsee, M. Edwards and H. W. Hilts in "The Chemistry of Inorganic Rings Systems", Ed. R. Steudel, Elsevier, 1992, pp.
2. T. Chivers and M. N. S. Rao, Phosphorus, Sulfur and Silicon, **69** (1992) 197.
3. L. N. Markovskii, E. A. Stukalo and G. P. Kunitskaya, Russ. J. Org. Chem. 1977, **13** (10), 1911.
4. J. Münzenberg, H. W. Roesky, M. Noltemeyer, S. Besser and R. Z. Herbst-Irmer, Z. Naturforsch. 1993, **48b**, 199.
5. M. Björgvinsson and H. W. Roesky, Polyhedron, **10**, 2353, 1991.