

and 610  $\text{cm}^{-1}$ , and these are three of the  $e'$  fundamentals. The fourth  $e'$  fundamental is the Raman frequency 162  $\text{cm}^{-1}$ , which is outside the infra-red region studied. In addition to this satisfactory correlation of the spectra it should be noted that although  $\text{—C}\equiv\text{N}$  vibrations are always intense the infra-red spectrum most certainly contains only one  $\text{—C}\equiv\text{N}$  frequency (2,175  $\text{cm}^{-1}$ ) whereas the Raman spectrum contains two (2,225 and 2,175  $\text{cm}^{-1}$ ), and that the infra-red band is coincident with the depolarized Raman line. This pattern of  $\text{—C}\equiv\text{N}$  frequencies is, in itself, strong evidence for the planar structure.

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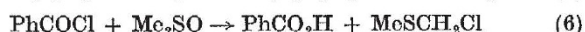
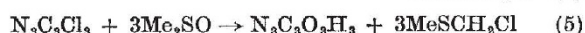
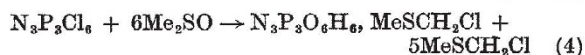
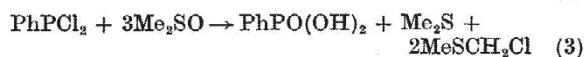
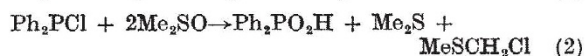
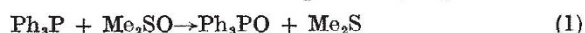
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### Reactions of Sulphoxides with Phosphorus Compounds and Reactive Organic Halides

DIMETHYL sulphoxide is known as an oxidizing agent for organic halogen derivatives<sup>1</sup> and certain aromatic methyl compounds<sup>2</sup>. Reactions of sulphoxides with acid anhydrides give carboxylic acids and acyl derivatives of sulphides<sup>3</sup>. Organic sulphoxides have attracted attention as ligands in co-ordination compounds; but silicon halides and diphenyl sulphoxide give halogenated diphenyl sulphides and silicon oxychlorides and/or silica<sup>4</sup>. Lappert and Smith<sup>5</sup> investigated addition compounds of sulphoxides with boron, silicon, and tin halides, and reaction with boron trichloride or silicon tetrachloride gave a boron oxychloride-chloromethyl methyl sulphide addition compound, or silica and chloro-substituted sulphides.

Our work with phosphorus compounds and organic halides is summarized in equations (1–6).



Dimethyl sulphoxide oxidizes certain trivalent phosphorus compounds to the quinquevalent state, when the by-product is dimethyl sulphide (1), or causes replacement of chlorine by hydroxyl in quinquevalent compounds, when chloromethyl methyl sulphide is formed (4). A combination of these processes is observed with diphenylchlorophosphine (2) and phenyldichlorophosphine (3). Hexachlorocyclo-triphosphazatriene gives a moisture-sensitive chloromethyl methyl sulphide addition compound of the hydroxyoxophosphazane (4), and the product of a

similar reaction with octachlorocyclo-tetraphosphazetetrane gives the dihydrate of tetrakis(hydroxy-oxo)cyclo-tetraphosphazane<sup>6</sup> on mild treatment with water.

Cyanuric chloride (5) and benzoyl chloride (6) are converted to cyanuric acid and benzoic acid respectively. It seems likely that this reaction will have wide applications to inorganic and organic compounds containing reactive halogen atoms.

Diphenyl sulphoxide is less reactive than dimethyl sulphoxide but the same pattern of behaviour is observed.

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<sup>4</sup> Issleib, K., and Tzschach, M., *Z. anorg. Chem.*, **305**, 198 (1960).

<sup>5</sup> Lappert, M. F., and Smith, J. K., *J. Chem. Soc.*, 3224 (1961).

<sup>6</sup> Shaw, R. A., Fitzsimmons, B. W., and Smith, B. C., *Chem. Revs.*, **62**, 247 (1962).

### Structures of Sepiapterin and Isepiapterin

SEPIAPTERIN and isosepiapterin are yellow, yellow-fluorescent compounds which occur in *Drosophila melanogaster* and accumulate in the sepia mutant. They are believed to be closely related 2-amino-4-oxo-6-acyltetrahydropteridines, the acyl group in isosepiapterin being propionyl and in sepiapterin, lactyl. However, there has been some controversy concerning the location of the hydrogen atoms on the pyrazine part of the molecule. Forrest<sup>1</sup> favoured a distribution of the hydrogens on the 5 and 8 positions largely by analogy with the yellow 5,8-dihydro compounds (for example, I) synthesized by Pfeleiderer and Taylor<sup>2</sup>, and with the 5,8-dihydro structure assigned to the red dihydroquinoxaline (II) on the basis of its nuclear magnetic resonance spectrum by Barltrop, Richards and Russell<sup>3</sup>.

Nawa<sup>4</sup>, on the other hand, considered the 7,8-dihydro structure more probable because of his

