

Pentafluoro-orthotellurates of Silicon, Germanium, and Tin

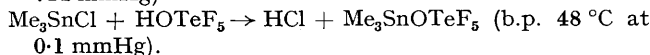
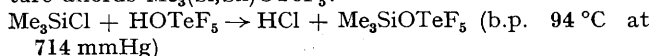
By FRIEDRICH SLADKY* and HOLGER KROPSHOFER

(Institut für Anorganische und Analytische Chemie der Universität, A 6020 Innsbruck, Innrain 52a, Austria)

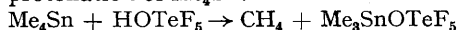
Summary Reaction of Me_4Sn , $\text{Me}_3(\text{Si,Ge,Sn})\text{Cl}$, and SiCl_4 with HOTeF_5 or AgOTeF_5 gives $\text{Me}_3(\text{Si,Ge,Sn})\text{OTeF}_5$ and $\text{Si}(\text{OTeF}_5)_4$; $\text{Me}_3\text{SiOTeF}_5$ has been tested as a reagent for the transfer of the F_5TeO group in metathetical reactions with fluorides and the structure of the adducts of $\text{Me}_3\text{-SnOTeF}_5$ with MeCN and Me_2SO has been studied by i.r. and n.m.r. spectroscopy.

THE F_5TeO group is an extremely versatile ligand for main group elements ranging from boron to xenon.¹ Owing to the high electronegativity and apolarity of this group, some of the pentafluoro-orthotellurates show interesting chemical behaviour [*e.g.* $\text{B}(\text{OTeF}_5)_3$ is superior to BF_3 in its Lewis acidity, and $\text{Xe}(\text{OTeF}_5)_2$ is the most stable xenon(II) complex except XeF_2].

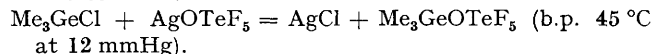
Reaction of HOTeF_5 with $\text{Me}_3(\text{Si,Sn})\text{Cl}$ at room temperature affords $\text{Me}_3(\text{Si,Sn})\text{OTeF}_5$:



Alternatively the latter compound can be prepared by protonation of Me_4Sn :



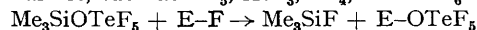
Interestingly Me_3GeCl does not interact with HOTeF_5 , but $\text{Me}_3\text{GeOTeF}_5$ can be prepared by use of AgOTeF_5 in acetonitrile solution:



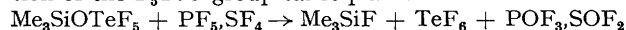
The same route affords $\text{Si}(\text{OTeF}_5)_4$:



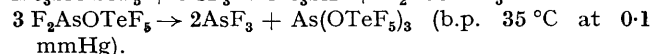
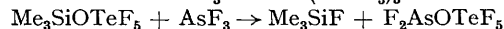
$\text{Me}_3\text{SiOTeF}_5$ has been tested as a reagent for the transfer of the F_5TeO group in metathetical reactions with covalent halides, such as PF_5 , AsF_3 , SF_4 , and TeF_6 :



With the exception of TeF_6 (no reaction) and AsF_3 , fluorination of the F_5TeO group takes place:



AsF_3 initially affords $\text{F}_2\text{AsOTeF}_5$ which dismutates on distillation to AsF_3 and $\text{As}(\text{OTeF}_5)_3$:



The co-ordination chemistry of $\text{Me}_3\text{SnOTeF}_5$ is of interest because of the ligand behaviour of the F_5TeO group. The coupling constants $J(^{119,117}\text{Sn-Me})$ at 58.1 and 55.2 Hz respectively are within the established range for four-coordinate tin² and indicate together with the presence of

$\nu_{\text{sym}}(\text{SnC}_3)$ at 512 cm^{-1} a non-bridging, covalently bound F_5TeO ligand. Interaction of $\text{Me}_3\text{SnOTeF}_5$ with an excess of MeCN or Me_2SO increases the tin-proton coupling constants by *ca.* 10 Hz, to values diagnostic of five-coordinate tin.³ The disappearance of $\nu_{\text{sym}}(\text{SnC}_3)$ in addition proves these adducts to be based on a trigonal bipyramidal geometry in which the methyl groups occupy the equatorial positions. Comparison of $R(=J_{\text{AB}}/\nu_0\delta_{\text{AB}})$ -values of the AB_4 type ^{19}F n.m.r. spectra of these adducts with $\text{Cs}^+\text{F}_5\text{TeO}^-$

allows a differentiation between the two possible structures $\text{Me}_3\text{Sn}(\text{L})\text{OTeF}_5$ (I) and $[\text{Me}_3\text{SnL}_2]^+[\text{F}_5\text{TeO}]^-$ (II). In accord with the lower donor strength of $\text{L} = \text{MeCN}$ structure (I) is indicated for the acetonitrile adduct, whereas the stronger base $\text{L} = \text{Me}_2\text{SO}$ promotes complete ionization of the F_5TeO group and formation of structure (II).

(Received, 4th June 1973; Com. 805.)

¹ A. Engelbrecht and F. Sladky, *Monatsh.*, 1965, **96**, 159; F. Sladky, H. Kropshofer, and O. Leitzke, *J.C.S. Chem. Comm.*, 1973, 134; A. Clouston, R. D. Peacock and G. W. Graser, *Chem. Comm.*, 1970; F. Sladky and H. Kropshofer, *Inorg. Nuclear Chem. Letters*, 1972, **8**, 195; F. Sladky, *Monatsh.*, 1970, **101**, 1559, 1571, 1578.

² P. B. Simons and W. A. G. Graham, *J. Organometallic Chem.*, 1967, **10**, 457.

³ M. K. Das, J. Buckle, and P. G. Harrison, *Inorg. Chim. Acta*, 1972, **6**, 17; T. F. Bolles and R. S. Drago, *J. Amer. Chem. Soc.*, 1966, **88**, 5730.