

NOTE

Some New Organotellurium(II) Molecular Adducts with Bidentate Ligands

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Thirty-six molecular adducts of the type $RR'Te \cdot L$ (where $R = R' = C_6H_5$; $R = R' = (p\text{-MeOC}_6\text{H}_4)$; $R = (p\text{-MeOC}_6\text{H}_4)$, $R' = (Me_2NC_6H_4)$; $R = (p\text{-EtOC}_6\text{H}_4)$, $R' = Me_2NC_6H_4$; $R = R' = C_6H_5CH_2$; $RR' = (C_6H_9)_2$ and $L =$ bidentate Lewis base, *i.e.*, 1,10, phenanthroline; 2,2'-bipyridine; bis(2-acetylpyrrole) phenylenediamine; bis(2-pyrrolecarboxylaldehyde) phenylenediamine; bis(2-pyridylcarboxylaldehyde) phenylenediamine and bis(2-naphthylaldehyde) phenylenediamine have been prepared and their structures have been established by elemental analysis, molar conductivity, IR and X-ray photoelectron spectroscopy.

Although a number of diorganotellurium(IV) molecular adducts are known, the diorganotellurium(II) molecular adducts are comparatively less known^{1,2}. In our previous communication, we have reported the diorganotellurium(II) molecular adducts with various monodentate ligands^{3,4}. This communication deals with the reaction of diorganotellurium(II) compounds with various bidentate ligands and to determine the structure by various physico-chemical techniques.

The $(C_6H_5)_2Te^5$; $(p\text{-MeOC}_6\text{H}_4)_2Te^6$; $(p\text{-MeOC}_6\text{H}_4)(p\text{-Me}_2NC_6\text{H}_4)Te^6$; $(p\text{-EtOC}_6\text{H}_4)(p\text{-Me}_2NC_6\text{H}_4)Te^6$; $(C_6H_5CH_2)_2Te^7$ and $(C_6H_4)_2Te^8$ were prepared and characterised according to literature procedure.

2 mmol of 2-acetylpyrrole, 2-pyrrole carboxyaldehyde, 2-pyridyl-carboxyaldehyde or 2-naphthylaldehyde in 25 mL dry chloroform were refluxed with 1 mmol of *o*-phenylenediamine for about 3 h. The resulting solids were filtered, washed, purified and air-dried. These were further analysed by elemental analysis.

1 mmol of $RR'Te$ in dry chloroform was refluxed with 1 mmol of bidentate ligand (L) for about 3 h. The resulting mixture was rotary evaporated and the concentrated solution was kept in deep freeze overnight. The product was obtained, washed with pet. ether and vacuum dried.

Conductance measurements were obtained in acetone at room temperature using Digisum electronic conductivity bridge. Infrared spectra were recorded in CsI on a Perkin-Elmer 457 spectrometer. The X-ray photoelectron spectra were recorded on a VG Scientific ESCA-3MK II electron spectrometer. The MgK_{α} X-ray line (1253.6 eV) was used for photoexcitation. The $Cu2p_{3/2}$ ($BE = 932.8 \pm 0.2$) and $Au4f_{7/2}$ ($BE = 83.8 \pm 0.1$) lines were used to calibrate the instrument and $Ag3d_{5/2}$ ($BE = 368.2$) was used for cross-checking⁹.

All molecular adducts are light coloured solids. They are soluble in common organic solvents and stable towards atmospheric oxygen and moisture. They all are stable at room temperature even for long time. Molar conductance of

10^{-3} M solution of the complexes was determined at room temperature. The values range from 20–30 $\text{ohm}^{-1} \text{cm}^2 \text{mole}^{-1}$ in acetone suggesting nonelectrolyte nature of all these complexes.

In the case of these molecular adducts, the $\nu(\text{C}=\text{N})$ modes undergo shift to higher wave-number suggesting the coordination by nitrogen atom of the ligands¹⁰. Infrared frequency associated with fundamental modes of vibration of $\nu(\text{Te}-\text{C})$ and $\nu(\text{Te}-\text{N})$ was observed in the range 260–203 cm^{-1} and 420–410 cm^{-1} respectively

It was observed that the binding energies of $\text{Te}3d_{3/2, 5/2}$ in starting material $\text{RR}'\text{Te}$ was higher than in prepared molecular adducts $\text{RR}'\text{Te}\cdot 2\text{L}$. These observations suggest that the electron density on tellurium metal ion has increased due to coordination of ligands with tellurium ion⁹. Moreover, the values of NIs binding energy (eV) in $\text{RR}'\text{Te}\cdot 2\text{L}$ molecular adducts have been noticed to be more than in free ligands. This also concluded the coordination of nitrogen atom with tellurium metal ion of $\text{RR}'\text{Te}$ ⁹.

On the basis of elemental analysis, conductivity data showing that all these molecular adducts are nonionic and IR and X-ray photoelectron spectra (XPS) results, showing the site of coordination, it is possible to assign a structure for each adduct as shown in Fig. 1. All these are having octahedral geometry (sp^3d^2 hybridisation) due to presence of two lone pairs on the tellurium atom.

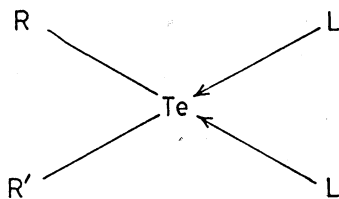


Fig. 1. Structure of $\text{RR}'\text{Te}\cdot 2\text{L}$

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