

NOTE

Diorganotellurium(IV) Dihalide Complexes with Bidentate Schiff Base Ligands-Part II

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Forty molecular adducts of organotellurium(IV) dihalide with bidentate Schiff base of the type $RR'TeX_2.SB$ have been synthesised and characterised by various physico-chemical techniques, *i.e.*, elemental analysis, molar conductivity, IR and X-ray photoelectron spectroscopy (XPS).

In the continuation of our previous communication¹, synthesis of organotellurium(IV) dihalide molecular adducts with bidentate Schiff base ligands of the type NO donor, this paper deals with synthesis of various organotellurium(IV) molecular adducts with bidentate Schiff base ligands of the type NN donor and further their structural determination by various physico-chemical methods.

$(p\text{-MeOC}_6\text{H}_4)_2\text{TeCl}_2^2$; $(\text{C}_6\text{H}_4)_2\text{TeCl}_2^3$; $(\text{C}_6\text{H}_5\text{CH}_2)_2\text{TeI}_2^4$; $(p\text{-Me}_2\text{NC}_6\text{H}_4)(p\text{-MeOC}_6\text{H}_4)\text{TeCl}_2^2$ and $(p\text{-Me}_2\text{NC}_6\text{H}_4)(p\text{-EtOC}_6\text{H}_4)\text{TeCl}_2^2$ have been prepared, purified and characterised by reported methods.

2 mmol of 2-acetylpyrrole or 2-pyrrole-carboxylaldehyde or 2-pyridyl-carboxylaldehyde or 2-naphthylaldehyde in 50 mL methanol was mixed with 1 mmol of *o*-phenylenediamine or ethylenediamine. The mixture was refluxed for *ca.* 3 h. TLC suggested complete conversion of ketone or aldehyde to Schiff base. The solid product was obtained after rotary evaporated. The product was air-dried and characterised by C, H and N analyses.

The following were obtained:

Bis(2-acetylpyrrole) phenylenediamine (SB₁), bis(2-acetylpyrrole) ethylenediamine (SB₂), bis(2-pyrrolecarboxylaldehyde) phenylenediamine (SB₃), bis(2-pyrrolecarboxylaldehyde) ethylenediamine (SB₄), bis(2-pyridylcarboxylaldehyde) phenylenediamine (SB₅), bis(2-pyridylcarboxylaldehyde) ethylenediamine (SB₆) bis(2-naphthylaldehyde) phenylenediamine (SB₇) and bis(2-naphthylaldehyde) ethylenediamine (SB₈).

1 mmol of $(p\text{-MeOC}_6\text{H}_4)_2\text{TeCl}_2$, $(\text{C}_6\text{H}_4)_2\text{TeCl}_2$, $(\text{C}_6\text{H}_5\text{CH}_2)_2\text{TeI}_2$, $(p\text{-Me}_2\text{NC}_6\text{H}_4)(p\text{-MeOC}_6\text{H}_4)\text{TeCl}_2$ or $(p\text{-Me}_2\text{NC}_6\text{H}_4)(p\text{-EtOC}_6\text{H}_4)\text{TeCl}_2$ in dry CHCl_3 was mixed with 1 mmol of any of the above prepared bidentate Schiff

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base. The mixture was refluxed for *ca.* 3 h. The solid product was obtained after rotary evaporation. It was further purified by pet-ether (60–80°C) and air-dried.

Conductance measurements in acetone were made at room temperature using a Digisun electronic conducting bridge. Infrared spectra were reported on a Perkin-Elmer 457 spectrophotometer in CsI. The X-ray photoelectron spectra were recorded on a VG Scientific ESCA-3MKII electron spectrometer. The AlK_{α} (1486.6 eV) was used for photoexcitation. The $\text{Cu}2p_{3/2}$ (BE = 932.8 ± 0.2 eV) and $\text{Au}4f_{7/2}$ (BE = 83.8 ± 0.1 eV) lines were used to calibrate the instrument and $\text{Ag}3d_{5/2}$ (BE = 368.2 eV) was used for cross-checking.⁵

All these diorganotellurium (IV) molecular adducts of Schiff base are stable at room temperature. The elemental analyses for all these molecular adducts for C, H and N were within $\pm 0.5\%$. The molar conductances were observed in the range of 20–30 $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$ in acetone suggesting nonelectrolyte nature⁶. Both elemental analysis and molar conductance have suggested the composition of $\text{RR}'\text{TeX}_2\cdot\text{SB}$.

All these molecular adducts exhibit the $\nu(\text{C}=\text{N})$ absorption at 1650 cm^{-1} to 1640 cm^{-1} in the free ligands^{7–12}. The lowering of this band in the molecular adducts indicates the coordination of nitrogen atoms of azomethine groups to the tellurium. The far IR spectra exhibited bands at $560\text{--}540 \text{ cm}^{-1}$, $420\text{--}410 \text{ cm}^{-1}$ and $280\text{--}290 \text{ cm}^{-1}$ for $\nu(\text{Te}-\text{C})^3$, $\nu(\text{Te}-\text{N})^3$ and $\nu(\text{Te}-\text{Cl})^3$ respectively.

It was shown that the binding energies of $\text{Te}3d_{3/2}$, $5/2$ in the starting material $\text{RR}'\text{TeX}_2$ was higher than prepared molecular adducts. One can conclude from these XPS data that the electron density on tellurium metal ion has been increased by coordination of Schiff base ligands with tellurium metal ion⁵. The N1s photoelectron peak in all these molecular adducts $\text{RR}'\text{TeX}_2\cdot\text{SB}$ have shown single symmetrical photoelectron peak having much higher binding energy than N1s photoelectron peak binding energy of their Schiff base ligands. These XPS data suggested that both nitrogen atoms of Schiff base ligand are coordinated to central metal ion⁵.

On the basis of the above mentioned results of physicochemical results, one can assign the geometry of these molecular adducts $\text{RR}'\text{TeX}_2\cdot\text{SB}$ as shown in Fig. 1.

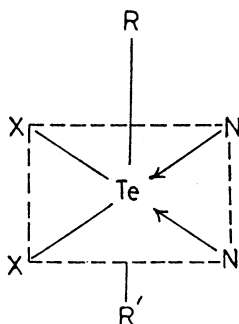


Fig. 1. Structure of $\text{RR}'\text{TeX}_2\cdot\text{SB}$.

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