Temperature influence on the synthesis of two new Hg(II) coordination polymers derived from $Hg(TePy)_2$

Iago F. de Sá[1](IC), Carolina A. Araújo[1](IC), Eliandro Faoro[1](PQ)*, Ernesto S. Lang[2](PQ), Davi F. Back[2](PQ)

**eliandrofaoro@ufgd.edu.br*

1 – Universidade Federal da Grande Dourados, Rodovia Dourados/Itahum, Km 12, Dourados-MS;
2 – Universidade Federal de Santa Maria, Avenida Roraima, nº 1000, Bairro Camobi, Santa Maria-RS

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Abstract

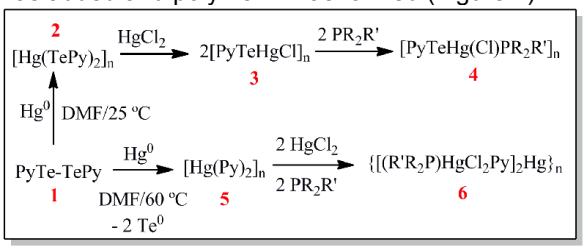
$(TePy)_2$ reacts with Hg^0 and $HgCl_2$ at r.t. and 60 °C to form $[PyTeHg(Cl)PR_2R']_n$ and $\{[(R_2R'P)HgCl_2Py]_2Hg\}_n$ respectively.

Introduction

Coordination polymers are a class of compounds consisting of metal ions bonded together through multidentate organic ligands in order to form a polymeric chain. The compounds can grow from one to three dimensions. Those differences give them different properties and applications such as magnetism, photoluminescence, catalysis, molecular adsorption and sensing.[1,2]

Results and Discussion

The oxidative addition of Hg^0 to the *bis*-4-pyridyl ditelluride (**1**)[3] in DMF at room temperature led to the formation of mercury (II) *bis*(4-pyridyltelluride) followed by the addition of $HgCl_2$ leading to the formation of compound **3** (Scheme 1). Then PR_2R' was added and polymer **4** was formed (Figure 1).



Scheme 1: Synthetic routes used to obtain compounds **4** and **6**. $PR_2R' = P(^tBu)_2(PhNMe_2)$.

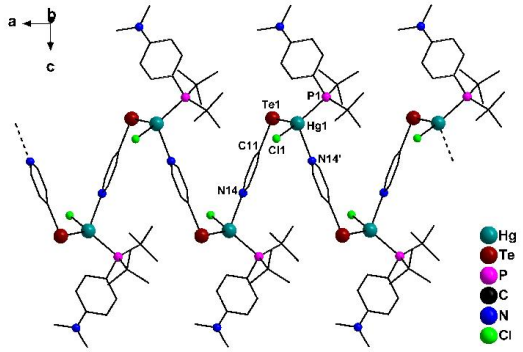


Figure 1. Polymeric structure of compound **4**.

When the *bis*-4-pyridyl ditelluride was carried out with Hg^0 at 60 ºC, the reductive elimination of tellurium and oxidative addition of Hg^0 was observed, forming the adduct $[Hg(Py)_2]_n$ (**5**). With further addition of two equivalents of $HgCl_2$ and PR_2R' polymer **6** (Figure 2) was obtained.

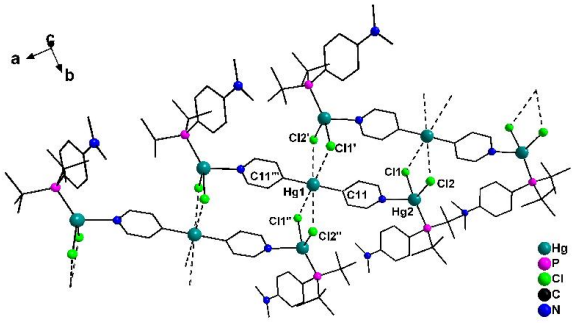


Figure 2. Polymeric structure of compound **6**.

The compounds **4** and **6** show a zigzag arrangement. Selected bond distances and angles are listed in Table 1.

Table 1. Selected bond distances (Å) and angles (°) for polymers **4** and **6**.

4	6
Te1-Hg1 = 2.691	C11-Hg1 = 2.078
Hg1-Cl1 = 2.570	C11'-Hg1 = 2.078
Hg1-P1 = 2.486	Hg1···Cl1' = 3.532
Hg1···N14' = 2.458	Hg1···Cl2' = 3.299
Te1-Hg1-P1 = 123.75	C11-Hg1-C11' = 180
Te1-Hg1-Cl1 = 113.84	Cl1'···Hg1···Cl2' = 180
Te1-Hg1-N14' = 101.06	(') = 1-*x*, -*y*, 1-*z*
(') = 0.5+*x*, 1.5-*y*, 1-*z*	(") = 2-*x*, -*y*, 1-*z*

Conclusion

Two new coordination polymers based on the $Hg(PyTe)_2$ were synthesized and characterized using different spectroscopic techniques and X-ray crystallography. It was observed that the reaction temperature is a decisive factor for the synthesis of these compounds.

Acknowledgments

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