Follow up by infrared spectroscopy of Sm(β-diketonate)$_3$(L)$_2$ complexes synthesis from Sm(L)$_4$Cl$_3$(H$_2$O)$_n$

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Introduction

Luminescent samarium complexes are used in several applications as for example: In the construction of efficient molecular light conversion devices (LCMD)[1] or in organic light-emitting diodes (OLEDs) applied to flat panel displays[2]. In this work it was prepared two samarium complexes with β-diketonate and non ionic ligands: Sm(β-diketonate)$_3$(L)$_2$ starting from Sm(L)$_4$Cl$_3$(H$_2$O)$_n$, for β-diketonate= TTA or DBM and L=DBSO or TPPO. The molecular structures of the ligands mentioned are shown in Figure 1.

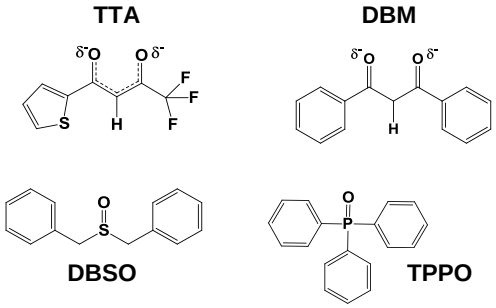

Figure 1. Molecular structures of the ligands TTA, DBM, DBSO, TPPO.

Results and Discussion

The two complexes were prepared by the following reactions:

$$Sm(DBSO)_4Cl_3(H_2O)_3 \xrightarrow[24\ h]{3DBM^+K^- \ MeOH} Sm(DBM)_3(DBSO)_2 + 3KCl + 3H_2O + 2DBSO$$

$$Sm(TPPO)_4Cl_3(H_2O)_2 \xrightarrow[24\ h]{3TTA^+K^- \ MeOH} Sm(TTA)_3(TPPO)_2 + 3KCl + 2H_2O + 2TPPO$$

Once purified, the complexes were characterized by: elemental analysis; infrared spectroscopy; ^{1}H NMR spectroscopy; ^{19}F NMR spectroscopy and ^{31}P NMR spectroscopy. Figure 2 shows the infrared spectra of Sm(DBSO)$_3$Cl$_3$(H$_2$O)$_4$, Sm(PTSO)$_3$Cl$_3$(H$_2$O)$_4$ and the target complexes: Sm(DBM)$_3$(DBSO)$_2$ and Sm(TTA)$_3$(TPPO)$_2$. In these spectra it was verified the main groups (S=O, P=O, C=O, =(C-H) and –CH$_2$) which are present in the structure of these samarium complexes.

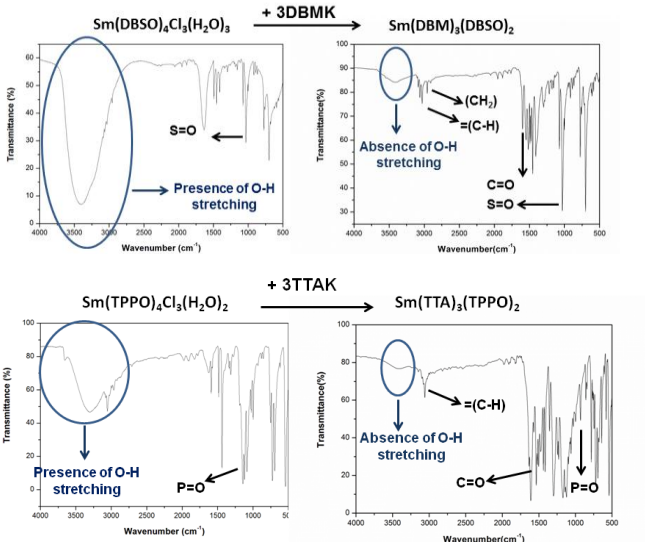

Figure 2. Infrared spectra of Sm(DBSO)$_3$Cl$_3$(H$_2$O)$_4$, Sm(TPPO)$_3$Cl$_3$(H$_2$O)$_2$, Sm(DBM)$_3$(DBSO)$_2$ and Sm(TTA)$_3$(TPPO)$_2$ complexes.

Using infrared spectroscopy (IR) it was possible to verify the complete formation of Sm(β-diketonate)$_3$(L)$_2$ complexes. Both analysis of the IR data of reactants (DBSO)$_4$Cl$_3$(H$_2$O)$_3$ and Sm(TPPO)$_4$Cl$_3$(H$_2$O)$_2$ a signal could be associated to the O-H stretching related to H$_2$O present in their structures which was not observed for Sm(DBM)$_3$(DBSO)$_2$ and Sm(TTA)$_3$(TPPO)$_2$ products, respectively.

Conclusion

It is possible to assure that samarium β-diketonate complexes can be prepared by substitution reactions. It was verified that IR is a useful tool to indicate the success of Sm(β-diketonate)$_3$(L)$_2$ complexes synthesis from Sm(L)$_3$Cl$_3$(H$_2$O)$_n$.

Acknowledgments

CNPq,, PRONEX/FACEPE, PROAES/UFPE.

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