

Trivalent lanthanide compounds with triphenylphosphine and triphenylarsene oxide ligands: Synthesis and characterization.

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The synthesis and luminescent properties of trivalent lanthanide compounds are justified by the fact that these compounds may act as excellent light emitters in Light Converter Molecular Devices (LCMD). This work reports the synthesis, characterization and investigation of the photoluminescent properties of Ln-compounds $\text{LnL}_3(\text{NO}_3)_3$, where L=triphenylphosphine oxide (TPPO), triphenylarsine oxide (TPAsO) and tricyclohexylphosphine oxide (THPO) as ligands and $\text{Ln}^{3+} = \text{Tb}^{3+}$, Gd^{3+} and Eu^{3+} . The luminescent properties of these systems were compared to each other in order to investigate the influence of phosphine oxide and arsine oxide ligands on luminescence of the lanthanide ions. The data obtained with complexometric titrations and elemental analysis of C, H and N for the synthesized complexes were in agreement with theoretical data. The absorption spectra in the infrared region showed bands at 1160 cm^{-1} , 870 cm^{-1} and 1110 cm^{-1} for the Tb^{3+} , Gd^{3+} , and Eu^{3+} complexes with TPPO, TPAsO and THPO ligands, respectively. These results indicate that the ligands are coordinated to the Ln^{3+} ions via oxygen atoms. The diffuse reflectance spectra of the Eu^{3+} and Tb^{3+} complexes showed similar intra-ligand absorption profiles in the series of compounds. The emission spectra of the complexes showed characteristic narrow bands belong to the intraconfigurational 4f-4f transitions centered on the lanthanide ions. The presence of the ${}^5\text{D} \rightarrow {}^7\text{F}$ transition for the Eu^{3+} -compounds indicate that lanthanide ions is located at a symmetry environment belong to C_n , C_{nv} or C_s point group.