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Synthesis and characterization of lanthanide complexes with a pentadentate triazine-based ligand

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Abstract: A series of mononuclear $[\text{Ln}(\text{L})(\text{H}_2\text{O})(\text{NO}_3)(\text{solv})]\cdot\text{solv}$, ($\text{Ln} = \text{Pr}$ (**1**), Nd (**2**), Sm (**3**), Eu (**4**), Gd (**5**), Tb (**6-6a**), Dy (**7**); $\text{solv} = \text{DMF}$, DMSO , H_2O) and $\text{L} = 2,4\text{-Bis}(2\text{-hydroxybenzylidenehydrazino})\text{-6-methoxy-}s\text{-triazine}$ complexes were prepared. The lanthanide(III) ions are nine-coordinated in the complexes and are bound to the O atoms of bidentate nitrate, three N and two O atoms of a pentadentate **L** ligand and one O atom from water and one O atom from dimethylformamide with a spherical capped square antiprism coordination environment in **1-7**. The compounds have been characterized by means of elemental analysis, IR spectroscopy, UV-vis spectroscopy, X-ray diffraction, and thermal analysis. Lanthanide-centered emission of the complexes is overlapped by the ligand emission.

Keywords: Lanthanide complexes, Triazine ligands, X-ray structure, Optical properties

1. Introduction

The research on lanthanide(III) complexes have attracted attention in recent years due to their well-defined spectroscopic and magnetic properties [1-5]. The rare earth RE^{3+} ions are potential local luminescent probes for diagnostic application in biological systems [6-8]. RE^{3+} based compounds are highly promising building blocks for preparation of a single-molecule and single-chain magnets [9, 10]. Many other potential applications in areas as diverse as catalysis, optics, magnetic resonance imaging (MRI) have been reported [11-13].

Chlorinated derivative of *s*-1,3,5-triazine called cyanuric chloride ($\text{C}_3\text{N}_3\text{Cl}_3$) and its derivatives are currently intensively studied heterocyclic compounds with interesting biological qualities for pharmaceutical industry, mainly antifungal, antibacterial, antimalaric and antineoplastic [14-16]. By simple substitution of chlorine atoms in cyanuric chloride, using controlled conditions

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