

# Coordination of lanthanide ions to a Schiff base ligand

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Lanthanide ions (Ln) have unique characteristics, which provide them with a variety of applications, mainly as coordination compounds, since some ligands, such as Schiff bases, can intensify their luminescent properties by the antenna effect.<sup>1</sup> Schiff are versatile ligands that are easy to produce. They have oxygen and nitrogen electron donor atoms in their structure, therefore promoting the stabilization of their coordination compounds containing Ln ions.<sup>2</sup> The aim of this work is the synthesis and characterization of new coordination compounds with Ln ions, using a Schiff base as ligand, with potential luminescent properties. The Schiff base ligand BS1 is derived from  $\beta$  amino acid (5- bromosalicil -beta-phenylalanine) with the aldehyde 5- bromosalicialdehyde.<sup>3</sup> Three novel lanthanide complexes were synthesized from BS1: Tb-BS1, Eu-BS1 and Gd-BS1. These complexes were obtained by similar syntheses methods, producing yellow precipitates, which were characterized by FT-IR and UV-Vis spectroscopy and luminescent studies. From the FT-IR data, it is possible to infer that, in all the complexes, the coordination of the lanthanide occurs by the oxygen atoms of the phenol group and carboxylate (bidentate) groups present in the ligand.<sup>4</sup> Table 1 shows the main vibrations found in the FT-IR data for the BS1 ligand and lanthanide complexes.

**Table 1.** Main vibrational bands wavenumbers observed in the FT-IR spectra for BS1, Tb-BS1, Eu-BS1 and Gd-BS1 (cm<sup>-1</sup>, KBr pellets).

Sample	$\nu(\text{OH})$	$\nu(\text{C}=\text{N})$	$\nu_{\text{ass}}(\text{COO}^-)$	$\nu_{\text{sim}}(\text{COO}^-)$	$\nu(\text{Ln}-\text{O})$	$\nu(\text{C}_{\text{Ar}}-\text{O})$ phenol
<b>BS1</b>	3447	1627	-	-	-	1268
<b>Tb-BS1</b>	3438	1675	1559	1468	539	1282
<b>Eu-BS1</b>	3421	1671	1564	1459	541	1279
<b>Gd-BS1</b>	3426	1633	1575	1471	524	1280

The formation of the complexes was also analyzed by shifts in the maximum absorption of the UV-Vis spectra. Luminescent studies on Tb-BS1 and Eu-BS1 revealed their potential as luminescent probes, exhibiting characteristic transitions of Tb<sup>3+</sup> and Eu<sup>3+</sup> ions in their emission spectra. Therefore, it was possible to observe the formation of 3 new lanthanide complexes derived from Schiff bases with potential luminescent properties (terbium and europium complexes).

## References

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