

Title: **Synthesis of coordination complexes of 3d with chiral asymmetric Schiff bases. Magnetic study.**

Student: Ernesto Costa Villén

Date: June 2019

Supervisor/s: Dr. Julia Mayans Ayats
Departament of Inorganic and Organic Chemistry

The main goal of this work was to obtain multi-property coordination compounds. Many trials were carried out with Ni(II), Fe(II), Mn(II) and Dy(III) cations and chiral and non-chiral asymmetric Schiff bases as organic ligands.

The different properties that were tried to combine in the final compounds were, on one hand, magnetic properties, especially Single Molecule Magnet (SMM) behaviour derived from the paramagnetic metallic centres and, on the other hand, optical properties provided by the chiral Schiff bases.

Two different Schiff bases were synthesized and characterized. An enantiomeric pair of chiral and asymmetric Schiff bases (RR and SS) 2-((E)-(((1S,2S/1R,2R)-2-amino-1,2-diphenylethyl)imino)methyl)-6-methoxyphenol (**S,S – HL1** and **R,R – HL1**) and the second one, independent of the other two, also asymmetric but not chiral (2-((E)-((2-((E)-pyridin-2-ylmethylene)amino)ethyl)imino)methyl)phenol (HL2). Derived from these bases, three different compounds have been synthesized and magnetically and spectroscopically characterized. Two of them (**EC6c** and **EC19**) an enantiomeric pair derived from **S,S – HL1** and **R,R – HL1** with formula $\text{Ni}_4\text{C}_{48}\text{H}_{56}\text{Cl}_4\text{N}_4\text{O}_8$ and a mononuclear Fe(III) complex with formula $\text{FeC}_{17}\text{H}_{20}\text{Cl}_2\text{N}_3\text{O}_2$ (**EC11b**) derived from **HL2**. The results show the same magnetic properties in the two compounds with the enantiomeric bases and a good response in the circular dichroism technique. Regarding compound **EC11b**, it shows very interesting magnetic properties including SMM behaviour.

A variety of techniques has been used in order to characterize the ligands and the obtained complexes.

Keywords: Molecular magnetism, SMM, coordination chemistry, Schiff bases, multi-property, chiral asymmetrical ligands.