Catalytic development and medical application of transition metal complexes (Re, Co, Cu) containing novel Salicylidene Schiff bases

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Schiff bases have a remarkable coordinative capability with a wide range of transition metals, making their application in various fields of chemistry a key research area [1]. It has been found that organometallic complexes containing Schiff base ligands, can play an important biological role displaying anti-bacterial, anti-fungal, anti-cancer, antioxidant, anti-inflammatory and antiviral activity [2].

Photoluminescence is an important field with fluorescent chemosensors being applied in biochemical, physiological and pharmacological studies where various types of analytes can be detected [3]. Some Schiff bases can photoluminesce and therefore be applied in the development of fluorescent chemosensors and radiopharmaceuticals. In the latter case, cellular imaging can identify intracellular drug distribution and compartmentalization. This information is used to elucidate the biochemical mechanism of these drugs [4]. A recent study showed the possibility of incorporating a Schiff base into targeting radiopharmaceuticals where it acts as a chelating agent to link the biomolecule to the radionuclide [5]. Its photoluminescence, ease of synthesis and structure-manipulation to contain a variety of functional groups, made Schiff bases an excellent candidate for this type of application.

Protein crystallography has proven vital in the field of drug design [6]. The molecular structure of the protein can be obtained which is necessary for the design of a suitable drug. Protein crystallography further provides structural information regarding protein-ligand interactions and subsequent insight into required ligand-modifications for optimal pharmacological action on molecular targets.

For this study, the main objective is to synthesize and fully characterise various sterically and electronically modified Schiff base ligands (IR, NMR, UV/Vis and single-crystal X-ray crystallography) followed by coordination to transition metals of Rh, Re, Pt, Pd, Co, Cu and Ni. Thereafter to perform luminescent analysis and protein crystallization on these ligands and complexes to observe protein-ligand interactions. These organometallic complexes can also potentially be utilized as catalysts in homogeneous catalysis, namely carbonylation, hydroformylation and homologation.

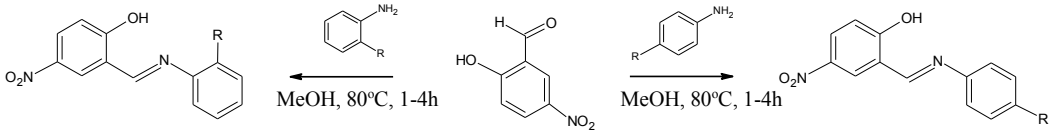

Figure 1. General reaction scheme for the synthesis of the *ortho* and *para* Schiff base ligands

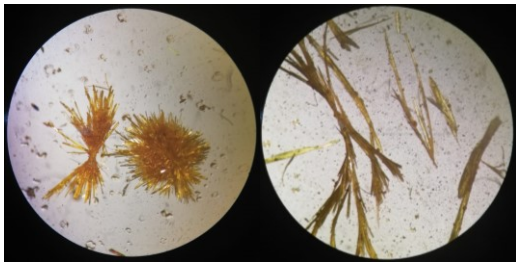

Figure 2. *p*NO_2-SalH-*o*F crystals (left), *p*NO_2-SalH-*p*F crystals (right)

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Keywords: Schiff base, X-ray diffraction, Luminescence, Cell testing, Catalysis

The author gratefully acknowledges Prof Alice Brink, Mr Francois Jacobs and Prof Ted Kroon for their guidance and contributions.