

Four decade research on macrocyclic Schiff base complexes

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Macrocyclic Schiff-base complexes containing the pyridine moiety was one of the early breakthroughs in the quest to synthesize macrocyclic metal complexes that might mimic the properties of naturally occurring macrocyclic complexes such as hemoglobin and chlorophyll, came from the reactions of 2,6-diacetylpyridine with polyamines first reported by Busch and co-workers from 1964 onwards and were main task of our research group during last four decades [1]. We reported the syntheses and characterization of some planar N4- and N5-metal ions Schiff base complexes containing a piperazine or homopiperazine moiety [2,3]. Macrocyclic ligands can have their structures extended through the attachment of pendant donor groups and the resulting metal complexes have found considerable significance. Development in this area derives from the concept that the presence of two or more pendant arms, attached at appropriate positions on a macrocyclic framework. We have hence developed a general method for synthesis of [1+1] macrocyclic complexes bearing a single alkylamine pendant arm via cyclocondasation of 2,6-diacetalpyridine with an appropriate tripodal tetraamine in the presence of the required metal ions and also a template Schiff-base condensation between 2,6-diacetylpyridine (DAP) and 2,6-diformylpyridine (DFP) with a number of branched hexadentate polyamines in the presence of appropriate metal ions leading to the preparation of new macrocyclic complexes having one and two 2-aminoethyl pendant arms, respectively. And furthermore synthesized some Mn(II)-N7 macrocyclic Schiff base complexes with two 2-pyridylmethyl pendant arms [1].

The insertion of phenanthroline within a macrocyclic framework are expected to form more stable complexes and may allow the resulting metal complexes to be solubilized in a polar solvent. It has thus been extensively used in both analytical and preparative coordination chemistry. Recently, we have used 2,9-dicarboxaldehyde-1,10 phenanthroline as a precursor to achieve several kinds of cyclocondensation reactions with a series of multi-amine derivatives, a number of macrocyclic Schiff base complexes and pendant armed macrocyclic Schiff base complexes have been prepared by the template reactions [4,5].

Keywords: Schiff base; 2,6-diacetylpyridine; 2,9-dicarboxaldehyde-1,10 phenanthroline; piperazine.

References

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