

**S.a.c.9. ABDUL RASHID, K.K. – Structural Studies on Some Metal Complexes of Embelin – 1987 – Dr. P.N.K. Nambisan and Jacob Chacko.**

Benzoquinones and their substituted derivatives are well known as versatile redox agents and are among the most pervasive natural products on the earth's surface. They possess numerous biologically significant properties and are present in several living organisms. Embelin (2, 5 – dihydroxy-3-undecyl-1, 4-benzoquinone or 2,5-dihydroxy-3-undecyl-2, 5-cyclohexadienone-1, 4-dione) an orange pigment isolated from the berries of the Indian shrub *Embelia Ribes* is of great medicinal

importance because of its anthelmintic, analgesic and antifertility properties. Biological studies on embelin have received considerable amount of attention in recent years. However, only very scant information is available on the metal chelates of embelin which could function as possible basis for the development of therapeutic drugs. Hence a systematic study of the preparation and properties of some metal complexes of embelin has been undertaken in view of its relevance in biological systems.

This thesis deals with the studies on the synthesis and characterisation of the complexes of embelin with manganese (II), cobalt (II), nickel (II), copper (II), zinc (II), cadmium (II), chromium (III) lanthanum (III), praseodymium (III) neodymium (III) samarium (II), gadolinium (II) dysprosium (II), yttrium (III) thorium (IV) and uranium (VI).

Coordination polymers, biological aspects of embelin and coordination of metal ions with biologically important ligands have been discussed in detail. Elemental analysis as well as spectral, thermal and magnetic data were used to ascertain the composition of the complexes and to establish the structures of the metal complexes. Wherever possible, the electronic spectra and magnetic data were used to predict the stereo-chemistry of the complexes.

Analytical data of the metal complexes of embelin indicated a metal to ligand ratio of 1:1 in the manganese (II), cobalt (II), nickel (II), copper (II), zinc (II), cadmium (II) and uranium (VI) complexes. The chromium (III), iron (III) and the lanthanide complexes exhibited an M:L ratio of 2:3. A ratio of 1:2 was observed for the thorium (IV) complex.

Infrared spectral data indicated that embelin behaved as a tetradentate ligand in all these complexes, coordinating through its carbonyl and phenolic oxygens.

Electronic spectra and magnetic studies indicated a tetrahedrally distorted planar coordination for copper (II) complex and tetrahedral coordination for chromium (III) and iron (III) complexes. Four-coordinated structures have been proposed for the lanthanide complexes. Thus the manganese (II), cobalt (II), nickel (II), zinc (II), and cadmium (II) complexes were octahedral, thorium (IV) complex was eight-coordinated and uranyl complex was six-coordinated.

On the basis of procedural decomposition temperatures (from thermoanalytical data) all the metal chelates investigated were shown to have enhanced thermal stabilities upon complexation. However, the divalent metal complexes of embelin were found to be thermally more stable than the iron (III), the chromium (III), the lanthanide and the actinide complexes.