

ABSTRACT

This thesis describes the preparation and study of a number of complexes of the bidentate ligand 3,4-dihydroxy-3-cyclobutene-1,2-dione (squaric acid) and some of the first row transition metals in ethanolic solution.

The divalent chlorides of iron, cobalt, nickel, manganese, copper and zinc react with squaric acid in ethanolic solution to form a series of complexes which contain bridging chlorine and the metal atoms showing various types of coordination. The iron(II), zinc(II) and nickel(II) complexes appear to be five coordinate, the cobalt(II) and copper(II) complexes four coordinate while the manganese(II) complex appears to have the manganese atoms in an octahedral environment. The complexes of iron, cobalt, nickel and manganese can be represented by the general formula $M_2(C_4O_4HCl)_2 \cdot nC_2H_5OH$; when $M = Co(II)$, $n = 1$; $n = 2$ otherwise. The copper and zinc complexes have the formulae $Cu_3(C_4O_4HCl_2)_2 \cdot C_2H_5OH$ and $Zn_3(C_4O_4HCl_2)_2 \cdot 3C_2H_5OH$ respectively. All these complexes are hygroscopic and with the exception of the manganese and zinc complexes undergo colour changes on exposure to the atmosphere.