

## Abstract

The stoichiometry of the complex formation and mechanism of fluorescence quenching of hydroxamic acids: 1-naphthol hydroxamic acid **14**, 1-naphthylaceto hydroxamic acid **15**, and 1-naphthylmethylmalano bis-hydroxamic acid **18**, with Fe(III), Cu(II), Mn(II) and Zn(II) were investigated in great detail by means of spectrophotometric and fluorometric methods. Complexes of 1:1, 1:2 and 1:3 of metal:ligand were formed and all of them gave charge transfer absorption bands at different wavelengths. The factors affecting the complexation were found as the pH of the medium, ligand and metal ion concentrations. Also [metal ion]:[ligand] at a given concentration of ligand was very important in determining the stoichiometry of the complex. The quenching of the fluorescence was found to be static and due to the formation of non-fluorescent complex in the ground state. All the metal ions studied, formed a 1:1 complex with the ligand **15** at pH 3.0, 5.6, 6.4 and 9.5 for Fe(III), Cu(II), Zn(II) and Mn(II) respectively. The ligand concentration was  $1 \times 10^{-5}$  mol dm<sup>-3</sup>. Linear Stern-Volmer plots were obtained for **14**, **15** and **18**. Formation constants (log K) for the 1:1 complexes of the hydroxamic acids with Fe(III), Cu(II), Zn(II) and Mn(II) were also estimated. For **14**, log K values were 3.7, 3.04 and 2.92 for Fe(III) at pH 3.25, Cu(II) at pH 5.6 and for Mn(II) at pH 9.5 respectively. Log K values for ligand **15** with Fe(III) at pH 3.25, Cu(II) at pH 5.6, Zn(II) at pH 6.4 and for Mn(II) at pH 9.5 were, 3.63, 3.72, 2.45 and 2.92 respectively. Values of log K for ligand **18** were 4.52, 5.09 and 4.22, for Fe(III) at pH 3.25, Cu(II) at pH 5.6 and for Mn(II) at pH 9.5 respectively.