Abstract

Hydroxamic acids are a group of naturally occurring or synthetic organic acids having the general formula RCONR'OH and they are weaker proton donors than the structurally related carboxylic acids RCOOH. The hydroxamic acids have one or more –CONHOH group which is related with their ability to form metal ions complexes. The aim of this research was to synthesise and study fluoroionophores consisting hydroxamic acid as the ion-receipting group linked to the fluorophore which is naphthalene. The compounds, 1-naphthalenemethyliminodiacetohydroxamic acid (**1**) and 1-naphthaleneiminodiacetohydroxamic acid (**2**) were synthesized. These two hydroxamic acids were examined as complexing agents for the transition metal ions Fe(Ill), Cu(II), and Zn(ll) in pure methanol and aqueous 0.02M β-cyclodextrin while changing the concentration of metal ions and pH.

The absorption spectra of Fe(III) with compound **1** and compound **2** at different pH indicated one isosbestic point suggesting the formation of two types of complexes. There is no absorption in the visible region for the compound **1** with Fe(III) and β-cyclodextrin as well as the complexes of Cu(II) and Zn(II) with compound **1** and compound **2**. Emission of Fe(III), Cu(II), and Zn(II) complexes show two (1:1and 1:2) and one (1:1) types of quenching mechanisms according to the Stern-Volmer plots and it is seen that fluorescence is higher in compound **1** than that of the compound **2**. Furthermore, it is observed that the fluorescence intensities of these compounds in β-cyclodextrin are higher than that in methanol. The quantum yields depend on the metal concentration and pH in the medium. The formation constants of compound **1** and **2** with Fe(III), Cu(II) and Zn(II) were calculated as a function of metal ion concentration. Further, it can be seen that these formation constants are higher in β-cyclodextrin than that in pure methanol medium. Therefore, it can be concluded that the medium of β-cyclodextrin has an influence to increase formation constants in complexes. The fluorescent sensors consisting fluorophore and ionophore is one of the attractive subject in the studies of chemosensors in the analysis of trace metal ions because of its high sensitivity due to the easy measurement of low analyte concentration and its selectivity due to the excitation and emission wavelength of fluorescent species.