

Abstract

Aurea-bis (7-DEA-coumarin-enamine) molecular probe has been synthesized that shows relay recognition of anion and cation via optical spectroscopy. Incorporating enamine-moiety to hydroxycoumarin allows to form two new six-membered ring system through Resonance-assisted-hydrogen-bonding (RAHB) that extends conjugation hence fluorescence intensity. Photo physical properties have been studied in different solvent systems. In DMSO, solution produced a pale greenish color with two broad absorptions band at 388nm and 475nm and emission at 550nm. Upon the addition of the various anions, only CH_3COO^- , F^- , CN^- , PO_4^{3-} anions perturbed the new ring system (RAHB) and generate optical response both in UV-vis and fluorescence. Cyanide ions produced distinct absorption and emission band than due to Michael-addition to enamine moiety whereas CH_3COO^- , F^- , PO_4^{3-} abstract proton from RAHB and form a tetradentate ligand cage. Upon the addition of various metals, only Cu_2^+ and Cu^+ ions shows optical response, absorption spectra shift bathochromically from 361nm to 370nm and emission spectra at 451nm quenched which means fluorescence turned 'OFF' via chelation quenched fluorescence (CHQF) mechanism. Furthermore, based on Hard-soft acid base (HSAB) theory Cu_2^+ and Cu^+ ions are hard acids and the tetradentate e ligand is a combination of hard bases, thus due to hard- hard interaction they form strong coordination bond. Size of the Cu_2^+ and Cu^+ ions also compatible as Ni_2^+ and Zn_2^+ ions shows weak interactions (copper ions size is in between nickel and zinc).