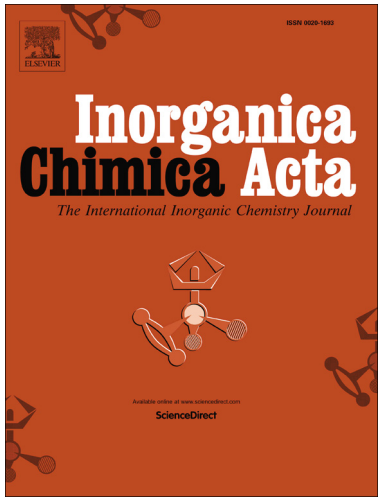

Research paper

Probing anion and cation with novel salicylidene Schiff base receptor appended with 1, 10-phenanthroline: mimicking INHIBIT molecular logic gate

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Probing anion and cation with novel salicylidene Schiff base receptor appended with 1, 10-phenanthroline: mimicking INHIBIT molecular logic gate

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Abstract: A novel tailor-made 1, 10-phenanthroline based Schiff base, 2-((E)-(1, 10-phenanthroline -5-ylimino) methyl) phenol, (**1**) receptor has been designed, synthesized and reported as multi-ion responsive scaffolds for the sensing of both anions and cations via chromogenic methods. In CH_3CN, receptor **1** displayed excellent selectivity for F^- ions amongst anions and for Al^{3+} and Hg^{2+} ions amongst cations. Moreover, the colorless solution of **1** turned yellow only with F^- ions due to new absorption band in visible region. Receptor **1** formed 1:1 complex with F^- ions while 1:2 with the Hg^{2+}/Al^{3+} ions as revealed by the separate Job's plot analysis. Receptor **1** can also mimic the functioning of "TRANSFER" and INHIBIT molecular logic gate with chemical inputs from Al^{3+} and F^- ions.

Keywords: 1, 10-phenanthroline, colorimetric, cation /anion recognition, Schiff base, molecular logic gates

1. Introduction

Schiff bases constitute a major category in coordination chemistry as their coordinating ability containing various donor atoms is widely reported. They have several applications in analytical chemistry, food and dye industry, catalysis and in many biological aspects [1-3]. The spectacular characteristics of Schiff bases like low cost simple synthesis coupled with synthetic tailorability, biodegradability, pronounced photophysical properties and ability to coordinate to metal ions tag Schiff bases as one of the most widely explored molecular chemosensors [4-6]. Schiff bases can be used for heavy metal sensing and removal of pollutant in the environment. They are good spectrophotometric and fluorimetric agents [2, 7]. The complexing ability of Schiff base has been attributed to the presence of azomethine linkage, which has a tendency to donate the lone pair of electrons present on the nitrogen atom of the azomethine moiety (C=N-). The structure of Schiff bases is responsible for geometric and cavity control of host guest complexation and