

A Smart Chemosensor: Discriminated Multidetector and Execution of Various logic Gates in Aqueous Solution at Biological pH

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Abstract:

A novel rhodamine and pyrazole based probe was designed and easily synthesized. The probe could to detect several analyts in aqueous solution at biological pH (HEPES, 7.2). the probe could to detect discrimintly Several catoions, including Cu²⁺, Fe³⁺, Al³, Hg²⁺ and Ni²⁺. The detection could be selective towards Cu²⁺ by using high concentration of HEPES (10⁻³ mole L⁻¹) in aquous solution and could be selective towards Hg²⁺ (by absorption spectrum) by working in pure organic medium (acetonitrile). By low concentration of HEPES buffer and one equivalent of cation, Fe³⁺ was discriminated by the enhancement of both the absorption at 530 nm and emission at 560 nm, but Al³⁺ enhanced only the emission at 560 nm remarkably (high quantum yield). Ni²⁺ could to be discriminated by increaing both absorption and emission after using ten equivalents of Ni²⁺ and low concentration of HEPES (10⁻⁵ mole L⁻¹). Also, the probe exhibited a good selectivity towards S₂O₅²⁻ by both absorption and emission spectra. Moreover, probe-Cu²⁺ complex could to detect several anions, including F⁻, CN⁻, S²⁻, CH₃COO⁻, CO₃²⁻, NO₂⁻. A further exploitation of the prepared probe, is its ability to work as a molecular logic gate to perform many gates including AND, NAND, NOR and INHIBIT logic gates.

Key words: Probe, Fluorescence, cations, anions, logic gates, smart probe.

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