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Acrylonitrile Embedded Benzimidazole-Anthraquinone Based Chromofluorescent Sensor for Ratiometric Detection of CN⁻ ions in Bovine Serum Albumin

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Graphical abstract



Highlights:

- Synthesis of probe 3 showing solvatochromic effect
- Ratiometric chromo-fluorescent detection of CN⁻ ions in H₂O/CH₃CN solvent
- Red emission in solution and solid state in presence of CN⁻ ions
- Detection of CN⁻ ions in BSA Solution

Abstract

A novel acrylonitrile embedded benzimidazole-based probe **3** has been designed and synthesized by conjugating anthraquinone with 2-(1*H*-benzo[*d*]imidazol-2-yl)acetonitrile. The probe **3** potentially detects CN⁻ ions in H₂O/CH₃CN (1:9; v/v), solid state, and plasma-like solution *via* chromo and fluorometric approach. The probe **3** displayed an absorption redshift from 415 nm to 472 nm and emission redshift from 510 nm to 610 nm in the presence of CN⁻ ions, in H₂O/CH₃CN (1:9; v/v). The probe **3** displayed colour change from yellow to orange along with red emission in the presence of CN⁻ ions. The probe **3** showed very low detection limit of 37×10^{-9} M. Furthermore, probe **3** is also utilized as a portable paper strip for on-site detection of CN⁻ ions to probe **3**.

Keywords: Chemodosimeter, Anthraquinone, Benzimidazole, BSA, Chromo-fluorescent

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