Title : Synthesis and optical properties of Azo Dye-Based Chemosensors Derived from 8-Hydroxyquinoline

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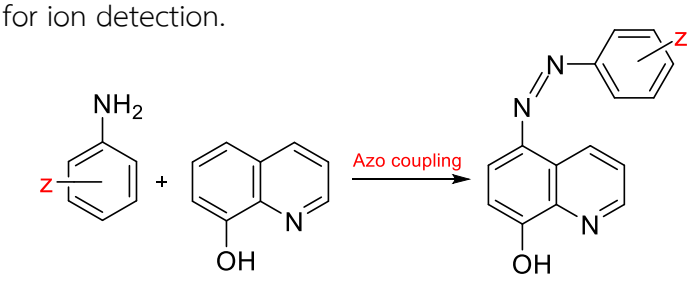
ABSTRACT

The synthesis of azo dyes derived from 8-hydroxyquinoline was carried out through azo coupling reactions with four different diazonium precursors, namely 2-nitroaniline, 4-nitroaniline, 4-aminobenzoic acid, and anthranilic acid to investigate the effects of electron-withdrawing substituents on their physicochemical and spectroscopic properties. The synthesized products contain an azo linkage (-N=N-) as the principal chromophore connecting two aromatic rings, forming an extended conjugated system responsible for visible light absorption. The derivatives incorporate different electron-withdrawing groups, namely nitro (-NO_2) and carboxyl (–COOH), enabling systematic comparison of substituent effects on electron delocalization within the azo–quinoline framework. UV–Visible spectroscopy showed characteristic absorption bands of the conjugated system, while Fourier Transform Infrared (FTIR) spectroscopy confirmed the presence of characteristic functional groups including -N=N-, -OH, -COOH, and -NO_2 consistent with the proposed structures. The purity of the synthesized compounds was verified by Thin Layer Chromatography (TLC). The results indicate that the azo linkage conjugated with 8-hydroxyquinoline significantly influences optical absorption behavior and color intensity, and that substituent variation affects electronic distribution within the conjugated system. This study opens opportunities for future advancements in the design of azo-based optical sensors for ion detection.



1a. Z = 2-NO_2
1b. Z = 4-NO_2
1c. Z = 2-COOH
1d. Z = 4-COOH

8-hydroxyquinoline

2a. Z = 2-NO_2
2b. Z = 4-NO_2
2c. Z = 2-COOH
2d. Z = 4-COOH

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