3-(2,6-Dichlorophenyl)-4-hydroxy-6-nitrocoumarin: Synthesis, Characterization, and Antibacterial Properties

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Abstract

Herein, 4-hydroxycoumarin was first treated with sodium nitrate in the presence of concentrated sulfuric acid to afford 6-nitro-4-hydroxycoumarin in a reasonable yield. 6-Nitro-4-hydroxycoumarin was then reacted with the diazonium salt derived from 2,6-dichloroaniline, and the corresponding azo dye was prepared and purified. This compound was characterized using Fourier transform infrared (FT-IR) and proton nuclear magnetic resonance (^{1}H NMR) spectroscopic techniques. The UV-vis spectroscopic behavior of the dye was then analyzed in six organic solvents with different polarities: ethanol, dimethyl sulfoxide, dimethyl formamide, chloroform, acetic acid, and acetonitrile. Fourier transform Infra-Red (FT-IR), Proton Nuclear Magnetic Resonance (1H NMR) spectroscopy confirmed the presence of two distinct azo-enol and hydrazone-keto isomers of the proposed tautomeric forms, both in the solid state and in solution. The UV-vis absorption spectra of the dyes remained largely unaffected by solvent changes, likely due to intramolecular hydrogen bonding within their molecular structures. The antibacterial activities of the azo-nitro product dissolved in DMSO were evaluated using the well diffusion method against Staphylococcus aureus (ATCC 25923) bacterial strains, and the results were compared with a standard specimen.

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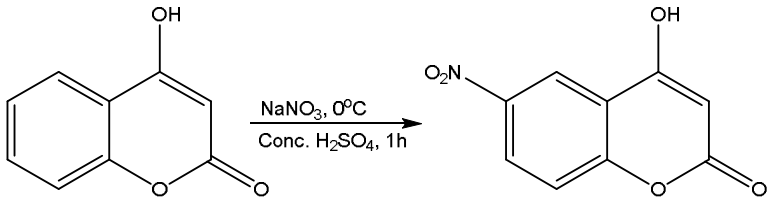
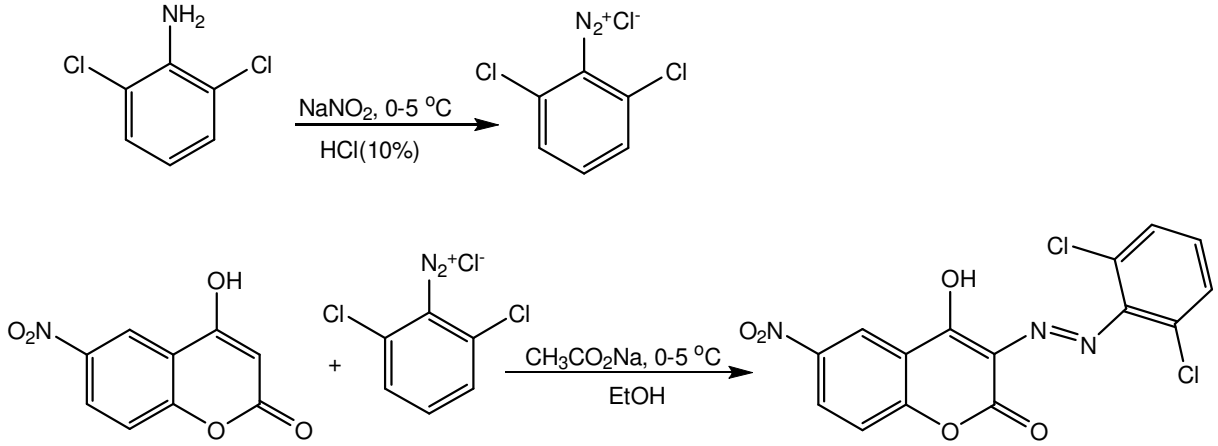
Keywords: 6-nNitro-4-hydroxycomarin, Spectroscopy, Nitration, azo dye, Antibacterial activities



Scheme1. Synthesis of 6-nitro-4-hydroxycoumarine



Scheme 2. Synthetic pathway to 3-(2,6-dichlorophenylazo)-4-hydroxy-6-nitrocoumarin.

Figure 1. Zone of inhibition for the compound (80 µl, 0.002 g/ml) against *Staphylococcus aureus* by well diffusion method.