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A Novel Colorimetric and Ratiometric Fluorescent Probe for Visualizing SO₂ Derivatives in Environment and Living Cells

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Abstract

Monitoring sulfur dioxide (SO₂) derivatives in environment is of great significance due to their harmful effects to the environment and human health. In this study, a fluorescent probe (**CZBT**) for SO₂ derivatives was prepared from 9-ethyl-9H-carbazole-3,6-dicarboxaldehyde and 2-methyl-benzothiazolium, which displayed a noticeable color change from yellow to colorless along with a remarkable fluorescence change from yellow to blue in response to HSO₃⁻. The probe could quantitatively determine the concentration of HSO₃⁻ with excellent selectivity, high sensitivity and low limit of detection. ¹H NMR and HR-MS spectra demonstrated that a selective 1, 4-nucleophilic addition occurred on the bridge double bond in **CZBT**. The probe was successfully used to determine the SO₂ derivatives in several real water samples with good recovery. Furthermore, the probe was employed for monitoring the level of intracellular HSO₃⁻ in HeLa (human cervical cancer) cells by fluorescence imaging. These results indicated that **CZBT** has a good capability for monitoring SO₂ derivatives in environment and living cells.

Key words: Colorimetric, Ratiometric, Fluorescent probe, SO₂ derivatives, Environment, Imaging

1. Introduction

In recent few years, Northern China usually encounters severe atmospheric pollution, in which SO₂ plays as an important atmospheric pollutant [1]. Sulfur dioxide (SO₂) as a toxic industrial gaseous waste is mainly generated from the combustion of coal. Epidemiological studies have

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