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Synthesis and Applicationof New Fluorescein Analogues

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Abstract

In this project, new derivatives of fluorescein were synthesized using the reaction of maleic anhydride and saccharin with phenol derivatives in the presence of ZnCl2, and their structures were elucidated by UV, IR, and NMR spectroscopy. Fluorimetry studies showed that, the synthesized compounds can be utilized as fluorescent agents, and their efficiencies were dependent on pH of solution. According to the results of HF/6-31+G*//HF/STO-3G calculations as well as experimental studies, the efficiency of fluorescein analogues derived from saccharin was less than the corresponding fluorescein.

Keywords*: Sodium saccharine, Maleic anhydride, Fluorescein, Ab initio.*

Introduction

Fluorescent detection technique has played a significant role in the advancement of modern medicine and molecular biology and has achieved rapid development [1]. Fluorescent detection has the advantages of being very sensitive, selective, rapid, safe reproducible and suitable for screening applications. It has been widely used in determining ion concentrations in cell, protein structures and functions, protein-protein interactions, drug-receptor interactions, DNA sequencing, immunoassay, and quantitative analyses of small molecules such as toxins and drugs [2-11].

Fluorescein (**1**)was first synthesized by Von Bayer in 1871[12]. The mechanism of its fluorescence behavior depends on the ring closing (**1Z**) and opening (**1Y**) equilibrium which takes place during UV absorption and fluorescent emission processes (Scheme 1) [13-14].

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