



Synthesis of novel probe 2-chloro-6-methoxy-3-phenyl hydrazone quinoline and its application to detection of persulphate in aqueous ethanol solution by fluorescence turn on

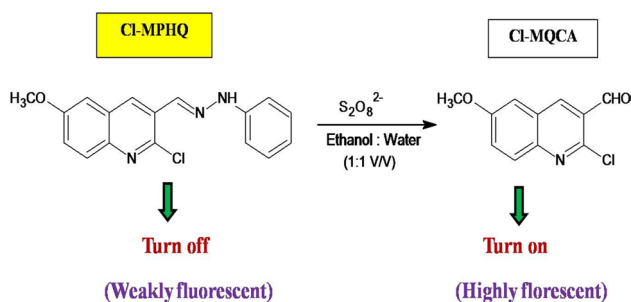
Dhanshri V. Patil¹ · Vishal S. Patil² · Sandeep A. Sankpal¹ · Govind B. Kolekar¹ · Shivajirao R. Patil¹

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Abstract

A highly sensitive and selective fluorimetric detection method has been developed for persulphate anion using fluorescence turn on of 2-chloro-6-methoxy-3-phenyl hydrazone quinoline (Cl-MPHQ) in aqueous ethanol solution. Cl-MPHQ is a weakly fluorescent compound synthesized via a one-step reaction of 2-chloro-6-methoxyquinoline-3-carboxyaldehyde (Cl-MQCA) and phenyl hydrazine. The treatment of Cl-MPHQ with persulphate ion in aqueous ethanol solution (1:1 V/V) generates fluorescent Cl-MQCA, through C=N bond cleavage. The fluorescence intensity increased linearly with the concentration of persulphate ion (0–100 $\mu\text{mol L}^{-1}$). The detection limit of the method is 1 $\mu\text{mol L}^{-1}$ determined from the standard deviation of the blank signal (3σ). The relative standard deviation of the method is 3% for 20 $\mu\text{mol L}^{-1}$ of persulphate ion. The proposed method is simple, sensitive and useful for selective detection of persulphate ion in an aqueous ethanol solution.

Graphical Abstract



Keywords 2-Chloro-6-methoxy-3-phenyl hydrazone quinoline · Fluorescence turn on · Persulphate ion detection

Introduction

Persulphate anion ($\text{S}_2\text{O}_8^{2-}$) is a strong, two-electron oxidizing agent with a redox potential of 2.01 V [1]. Persulphate is widely used for chemical oxidation of organic contaminants in polluted soil, ground-water and wastewater [2–11]. Persulphate salts have many uses, such as bleaching of textiles and natural fibers, removal of thiosulphate anions from photographic plates, initiators for olefin polymerization and etching of printed circuit boards and photo resists [12]. The analytical methods available for the determination of persulphate include iodometry and spectrophotometry [5, 13–16].

✉ Dhanshri V. Patil
dtp.phy@gmail.com

¹ Fluorescence Spectroscopy Research Laboratory,
Department of Chemistry, Shivaji University, Kolhapur,
Maharashtra 416 004, India

² Department of Chemistry, Sanjeevan Engineering &
Technology Institute, Panhala, Maharashtra 416201, India