DETEKSI ION FLUORIDA BERBASIS *TURN-ON FLUORESCENCE* MENGGUNAKAN METAL-ORGANIC FRAMEWORKS (MOFs) UIO-66-NH_2 TERFUNGSIONALISA HISTIDIN

MUH RIZAL B
22/501804/PPA/06401

INTISARI

Fungsionalisasi UiO-66-NH_2 dengan histidin membentuk UiO-66-NH_2@Histidin telah berhasil dilakukan dengan metode solvotermal. Keberhasilan hasil sintesis telah terkonfirmasi dengan munculnya puncak khas pada 2θ sekitar 7,46^o (111); 8,52^o (200) dan 25,81^o (600) pada difraktogram *X-Ray Diffraction* (XRD), serta dibuktikan dengan spektra *Fourier Transform Infrared Spectroscopy* (FTIR). UiO-66-NH_2@Histidin juga telah dikarakterisasi dengan instrumen *Field Emission Scanning Electron Microscopy* (FE-SEM), *Transmission Electron Microscopy* (TEM), *Surface Area Analyzer* (SAA), Spektrofotometer UV-Vis, dan Spektrofluorometer.

Hasil penelitian menunjukkan bahwa kondisi optimum konsentrasi UiO-66-NH_2@Histidin terhadap deteksi ion fluorida adalah 2 mg mL^{-1} dengan *respon time* 1 menit. Deteksi ion fluorida memberikan respon intensitas fluoresensi terbaik pada media air dan tidak ada respon pada pelarut non polar. Deteksi pada pH 3-10 memberikan respon intensitas fluoresensi yang relatif sama dan mengalami penurunan yang cukup signifikan pada pH 11-13. UiO-66-NH_2@Histidin sangat selektif dan stabil terhadap ion fluorida yang dibuktikan intensitas fluoresensi tertinggi dan munculnya fenomena penderan berwarna biru pada larutan dibawah sinar UV λ_{365} nm apabila dibandingkan dengan anion-kation lainnya. Nilai LoD yang diperoleh pada penelitian ini adalah 0,011 ppm, dimana nilai tersebut lebih kecil dari konsentrasi maksimum ion fluorida dalam sampel air minum menurut *World Health Organization* (WHO) yaitu 1,5 ppm, sehingga material UiO-66-NH_2@Histidin dapat diaplikasikan langsung pada sampel air minum.

Kata kunci: fluorosensi, histidin, ion fluorida, UiO-66-NH_2

TURN-ON FLUORESCENCE-BASED FLUORIDE ION DETECTION USING HISTIDINE FUNCTIONALIZED METAL-ORGANIC FRAMEWORKS (MOFs) UiO-66-NH_2

Muh Rizal B
22/501804/PPA06401

ABSTRACT

Functionalization of UiO-66-NH_2 with histidine to form UiO-66-NH_2@Histidine has been successfully carried out using the solvothermal method. The success of the synthesis results has been confirmed by the appearance of a characteristic peak at 2θ around 7.46o (111); 8.52o (200) and 25.81o (600) on the X-Ray Diffraction (XRD) diffractogram, and proven by Fourier Transform Infrared Spectroscopy (FTIR) spectra. UiO-66-NH_2@Histidine has also been characterized using Field Emission Scanning Electron Microscopy (FE-SEM), Transmission Electron Microscopy (TEM), Surface Area Analyzer (SAA), UV-Vis Spectrophotometer, and Spectrofluorometer instruments.

The research results showed that the optimum concentration conditions for UiO-66-NH_2@Histidine for fluoride ion detection were 2 mg mL-1 with a response time of 1 minute. Fluoride ion detection provides the best fluorescence intensity response in water media and no response in non-polar solvents. Detection at pH 3-10 gave a relatively similar fluorescence intensity response and experienced a significant decrease at pH 11-13. UiO-66-NH_2@Histidine is very selective and stable towards fluoride ions as evidenced by the highest fluorescence intensity and the appearance of a blue luminescence phenomenon in solution under λ365 nm UV light when compared to other ions. The LoD value obtained in this study was 0.011 ppm, which is smaller than the maximum concentration of fluoride ions in drinking water samples according to the World Health Organization (WHO), namely 1.5 ppm so that the UiO-66-NH_2@Histidine material can be applied directly in drinking water samples.

Keywords: fluorescence, fluoride ion, histidine, UiO-66-NH_2