SINTESIS FILM PVA-NATRIUM ALGINAT TERIMOBILISASI 1-(2-PYRIDYLAZO)-2-NAPHTHOL UNTUK DETEKSI Cu(II) SECARA KOLORIMETRI

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INTISARI

Sintesis film PVA-natrium alginat sebagai matriks imobilisasi 1-(2-pyridylazo)-2-naphthol (PAN) untuk deteksi Cu(II) secara kolorimetri telah dilakukan. Penelitian ini bertujuan untuk mendapatkan kondisi optimum deteksi Cu(II) serta validitas metode menggunakan film PVA-natrium alginat-PAN. Pengaruh logam interferen dipelajari untuk mengetahui selektivitas dari film PVA-natrium alginat-PAN. Film PVA-natrium alginat-PAN dibuat dengan mencampurkan larutan PVA dan natrium alginat hingga homogen kemudian dipanaskan pada suhu ± 80 °C. Film PVA-natrium alginat kemudian direndam dalam larutan $CaCl_2$ 2% dan PAN masing-masing selama 24 jam. Film yang dihasilkan kemudian dikeringkan dan dikarakterisasi menggunakan FTIR dan SEM. Penentuan kondisi optimum deteksi dan menentukan kinerja metode seperti linearitas, batas deteksi, dan batas kuantifikasi, presisi, selektivitas serta akurasi dilakukan dengan mengukur absorbansi film menggunakan Spektrofotometer UV-Vis.

Konsentrasi optimum larutan PAN yang dapat terimobilisasi ke dalam film PVA-natrium alginat dengan rasio 7:3 sebesar 0,4% b/v. Pengukuran absorbansi film optimum dilakukan pada panjang gelombang 560 nm pada pH 5 selama 2 menit. Linearitas film PVA-natrium alginat-PAN adalah 0,998 dengan batas deteksi dan batas kuantifikasi sebesar 0,0544 dan 0,181 mg L^{-1}. Film sensor memiliki presisi dan akurasi yang baik dengan nilai RSD 1-3% dan hasil perolehan kembali Cu(II) sebesar 93-101%. Keberadaan Cd(II), Pb(II), Mn(II), dan Fe(III) tidak menginterferensi pengukuran Cu(II), sedangkan keberadaan Co(II) dengan konsentrasi 2 dan 4 kali lebih tinggi dapat menurunkan absorbansi dan keberadaan Zn(II) dan Ni(II) dengan konsentrasi 2 dan 4 kali lebih tinggi dapat menaikkan absorbansi, maka film PVA-natrium alginat-PAN dapat digunakan untuk deteksi Cu(II) di dalam air limbah dan air minum.

Kata kunci: film PVA-natrium alginat, PAN, deteksi kolorimetri Cu(II)

SYNTHESIS OF 1-(2-PYRIDYLAZO)-2-NAPHTHOL IMMOBILIZED PVA-SODIUM ALGINATE FILMS FOR COLORIMETRIC DETECTION OF Cu(II)

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ABSTRACT

Synthesis of PVA-sodium alginate film as immobilization matrix of 1-(2-pyridylazo)-2-naphthol (PAN) for detection of colorimetry of Cu(II) has been conducted. The aims of this study were to obtain the optimum conditions of Cu(II) detection and the validity of the method using PVA-sodium alginate-PAN films. The influence of interference metals were studied to determine the selectivity of PVA-sodium alginate-PAN films. The PVA-sodium alginate-PAN film was made by mixing PVA solution and sodium alginate solution until it was homogeneous then dried at ± 80 °C. The PVA-sodium alginate film was then immersed in a solution of 2% $CaCl_2$ and PAN for 24 hours respectively. The resulted films were dried and characterized using FTIR and SEM. Determination of optimal conditions for detection and determine the performance of method such as linearity, limit of detection and limit of quantification, precision, selectivity and accuracy was carried out by measuring the absorbance of the film using a UV-Vis spectrophotometer.

The optimum concentration of PAN could be immobilized in PVA-sodium alginate films in ratio 7:3 was 0.4%. The optimum absorbance of the film was measured at 560 nm after detection for 2 minutes at pH 5. The linearity of the PVA-sodium alginate-PAN films was 0.998 with limit of detection and limit of quantification as low as 0.0544 and 0.181 mg L^{-1}. Film sensors have good precision and accuracy with RSD 1-3% and recovery value 93-101%. The presence of Cd(II), Pb(II), Mn(II) and Fe(II) does not interfere with Cu(II) measurements, while the presence of Co(II) with concentrations of twice and four times higher than Cu(II) gives result in absorbance decrease and the presence of Zn(II) and Ni(II) with concentrations of twice and four times higher give an absorbance increase, hence the PVA-sodium alginate-PAN films can be used for the detection of Cu(II) in wastewater and drinking water.

Keywords: PVA-sodium alginate films, PAN, colorimetric detection of Cu(II)