SINTESIS FILM KITOSAN-PEKTIN TERIMOBILISASI 1-(2-PIRIDILAZO)-2-NAFTOL UNTUK DETEKSI KOLORIMETRI ION Co(II)

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INTISARI

Sintesis film kitosan-pektin sebagai matriks imobilisasi 1-(2-piridilazo)-2-naftol (PAN) untuk deteksi kolorimetri Co(II) telah dilakukan. Penelitian ini bertujuan untuk mengembangkan metode deteksi ion Co(II) berbasis film matriks padat, menentukan kondisi optimum serta menguji kemampuan film kitosan-pektin-PAN sebagai detektor kolorimetri ion Co(II) melalui berbagai parameter validasi metode.

Film kitosan-pektin dibuat dengan mencampurkan kitosan dan pektin pada rasio 9:1 dalam larutan asam asetat hingga homogen kemudian dikeringkan pada suhu ruang. Film kitosan-pektin kemudian direndam dalam NaOH 1% selama 6 jam hingga film terlepas dari cetakan. Film yang dihasilkan kemudian dibilas dengan aquades hingga pH netral dan dikeringkan lalu direndam dalam larutan PAN selama 24 jam. Film dikarakterisasi menggunakan FTIR dan SEM. Absorbansi film diukur menggunakan spektrofotometer UV-Vis untuk menentukan kondisi optimum dan parameter validasi metode seperti linearitas, batas deteksi dan batas kuantisasi, presisi, selektivitas serta akurasi.

Konsentrasi optimum larutan PAN untuk imobilisasi pada film kitosan-pektin adalah 0,3% b/v dalam etanol. Pengukuran absorbansi film optimum dilakukan pada panjang gelombang 641 nm pada pH 4 selama 20 menit. Film memiliki selektivitas yang baik terhadap ion Co(II) dengan keberadaan ion-ion logam interferen Mn(II), Pb(II), Cu(II), Ni(II), maupun Cr(III). Linearitas film kitosan-pektin-PAN adalah 0,9996; batas deteksi sebesar 0,009 mg L^{-1}, batas kuantifikasi sebesar 0,029 mg L^{-1} serta presisi dan akurasi yang cukup tinggi ditunjukkan dengan nilai RSD<8% dan persen perolehan kembali sebesar 82-101%.

Kata kunci: film kitosan-pektin, deteksi kolorimetri Co(II), 1-(2-piridilazo)-2-naftol

SYNTHESIS OF CHITOSAN-PECTIN FILM WITH IMMOBILIZED 1-(2-PYRIDYLAZO)-2-NAPHTHOL FOR COLORIMETRIC DETECTION OF Co(II) ION

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ABSTRACT

The chitosan-pectin film with immobilized 1-(2-pyridylazo)-2-naphthol (PAN) has been developed for colorimetric detection of Co(II) ions. This research aimed to develop a Co(II) ions detection method based on solid matrix film, determine the optimum conditions, and test the chitosan-pectin-PAN film's ability as a colorimetric detector for Co(II) ions through validation method parameters.

The chitosan-pectin film was made by mixing the chitosan and pectin with a mass ratio of 9:1 in the acetic acid solution until it was homogenous then dried at room temperature. Chitosan-pectin films were soaked in 1% NaOH solution for 6 hours and washed with distilled water until neutral pH was reached. The dried films were immersed in PAN solution for 24 hours. The chitosan-pectin-PAN film was characterized using FTIR and SEM. The absorbance of films was measured using a spectrophotometer UV-Visible to determine the optimum condition and validation method parameters such as linearity, the limit of detection and quantification, precision, selectivity, and accuracy.

The optimum concentration of PAN immobilized in chitosan-pectin films was 0.3% w/v in ethanol. The maximum absorbance of sensors was obtained at wavelength 641 nm. The optimum condition of the sensor was at pH 4 for 20 min. The film sensor has good selectivity to Co(II) ions in the presence of interfering metal ions Mn(II), Pb(II), Cu(II), Ni(II), and Cr(III). The linearity of the chitosan-pectin-PAN film was 0.9996, with the limits of detection (LOD) and quantification (LOQ) were 0.009 and 0.029 mg L^{-1}, respectively. The film has good precision and accuracy with a relative standard deviation of less than 8% and a %recovery value between 82-101%.

Keywords: chitosan-pectin film, colorimetric detection of Co(II), 1-(2-pyridylazo)-2-naphthol