

SINTESIS NANOPARTIKEL ALGINAT-KITOSAN TERIKAT SILANG GLUTARALDEHIDA DAN KALSIMUM KLO RIDA SEBAGAI ADSOR BEN PARASETAMOL

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INTISARI

Penelitian tentang nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida sebagai adsorben parasetamol telah dilakukan. Penelitian ini dilakukan dengan melakukan sintesis nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida. Metode yang digunakan adalah metode gelasi ionik. Nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida dikarakterisasi menggunakan spektrofotometer inframerah (FTIR), *Scanning Electron Microscopy* (SEM), dan *Transmission Electron Microscopy* (TEM). Kajian adsorpsi parasetamol dilakukan melalui penentuan kondisi optimum untuk parameter pH, massa adsorben, waktu kontak, dan konsentrasi awal parasetamol.

Hasil karakterisasi menunjukkan bahwa nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida telah berhasil disintesis. Nanopartikel yang dihasilkan berwujud padatan serbuk kasar dan berwarna kuning kecoklatan. Citra TEM menunjukkan rata-rata ukuran nanopartikel adalah sebesar 8,22 nm. Kondisi optimum adsorpsi parasetamol oleh nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida diperoleh pada pH 4, massa adsorben 0,030 g, waktu kontak selama 45 menit dan konsentrasi awal parasetamol adalah 16 ppm dengan kapasitas adsorpsi sebesar 14,3396 mg/g. Studi kinetika adsorpsi mengikuti *pseudo-second order* dengan konstanta laju adsorpsi sebesar 0,0324 g mg⁻¹ menit⁻¹. Studi isotherm adsorpsi parasetamol oleh nanopartikel alginat-kitosan terikat silang glutaraldehida dan kalsium klorida mengikuti model isotherm Dubinin-Radushkevich dengan nilai energi bebas rata-rata sebesar 707,107 kJ mol⁻¹, nilai ini menandakan bahwa proses adsorpsi berlangsung secara kimia atau kemisorpsi.

Kata kunci: adsorpsi, alginat, kitosan, glutaraldehida, parasetamol

**SYNTHESIS OF ALGINATE-CHITOSAN NANOPARTICLES
CROSSLINKED GLUTARALDEHYDE AND CALCIUM CHLORIDE
AS A PARACETAMOL ADSORBENT**

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ABSTRACT

Research on alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride as paracetamol adsorbent has been carried out. This research was started by synthesizing alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride. The method used was ionic gelation method. Alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride were characterized by using infrared spectrophotometer (FTIR), Scanning Electron Microscopy (SEM), and Transmission Electron Microscopy (TEM). Paracetamol adsorption study was carried out by determining the optimum conditions for pH parameters, adsorbent mass, contact time, and initial concentration of paracetamol.

The characterization results showed that alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride had been successfully synthesized, the form of nanoparticles were coarse solid powder and brownish yellow. The TEM image shows the average nanoparticle size of 8,22 nm. Optimum conditions for paracetamol adsorption by alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride were obtained at pH 4, adsorbent mass of 0.030 g, contact time of 45 min and the initial concentration of paracetamol was 16 ppm with an adsorption capacity of 14.3396 mg/g. The study of adsorption kinetics followed a pseudo-second order or Ho-McKay model with an adsorption rate constant of $0.0324 \text{ g mg}^{-1} \text{ min}^{-1}$. The isotherm study of paracetamol adsorption by alginate-chitosan nanoparticles crosslinked glutaraldehyde and calcium chloride followed the isotherm Dubinin-Radushkevich isotherm model with an average free energy value of $707.107 \text{ kJ mol}^{-1}$, this value indicated that the adsorption processed by chemically or chemisorption.

Keywords: adsorption, alginate, chitosan, glutaraldehyde, paracetamol