

## **NANOPARTIKEL ALGINAT-KITOSAN SEBAGAI ADSORBEN ION LOGAM Zn(II) DAN UJI AKTIVITAS ANTIBAKTERINYA**

Nissa Alfitra

18/424228/PA/18333

### **INTISARI**

Penelitian tentang nanopartikel alginat-kitosan sebagai adsorben ion logam Zn(II) dan uji aktivitasnya terhadap bakteri *Escherichia coli* dan *Staphylococcus aureus* telah dilakukan. Penelitian ini dilakukan dengan melakukan sintesis dan karakterisasi nanopartikel alginat-kitosan dengan metode mikroemulsi menggunakan pengikat silang natrium tripolifosfat dan kalsium klorida. Nanopartikel alginat-kitosan dikarakterisasi menggunakan FTIR, SEM, dan TEM. Kajian adsorpsi Zn(II) dilakukan melalui penentuan kondisi optimum untuk parameter pH, massa adsorben, waktu kontak, dan konsentrasi awal ion logam. Nanopartikel alginat-kitosan sebelum adsorpsi dan setelah adsorpsi kemudian diuji aktivitas antibakteri terhadap bakteri Gram negatif berupa *Escherichia coli* dan Gram positif berupa *Staphylococcus aureus*.

Hasil penelitian menunjukkan bahwa nanopartikel alginat-kitosan telah berhasil disintesis berwujud padatan serbuk kasar dan berwarna putih gading. Citra TEM menunjukkan rata-rata ukuran nanopartikel sebesar 8,31 nm. Kondisi optimum adsorpsi Zn(II) oleh nanopartikel alginat-kitosan didapatkan pada pH 6, massa adsorben 0,07 g, waktu kontak selama 90 menit dan konsentrasi awal ion logam 16 ppm. Studi kinetika adsorpsi mengikuti orde dua-semu dengan konstanta laju adsorpsi 0,120 g/mg menit. Studi isoterm adsorpsi mengikuti model isoterm Dubinin-Radushkevich dengan energi bebas sebesar 912,9 kJ/mol yang menandakan bahwa proses adsorpsi berlangsung secara kemisorpsi. Nanopartikel alginat-kitosan-Zn memiliki sifat bakteriostatik.

Kata kunci : alginat-kitosan, antibakteri, Zn(II)

***ALGINATE-CHITOSAN NANOPARTICLES AS A Zn(II) METAL ION  
ADSORBENT AND TESTING ITS ANTIBACTERIAL ACTIVITY***

Nissa Alfitra  
18/424228/PA/18333

**ABSTRACT**

A study of alginate-chitosan nanoparticles as Zn(II) metal adsorbent and activity test on a *Escherichia coli* and *Staphylococcus aureus* bacteria was studied. This research was carried out by synthesizing and characterizing alginate-chitosan nanoparticles by microemulsion method with crosslinking of sodium tripolyphosphate and calcium chloride. The nanoparticles were characterized using FTIR, SEM, and TEM. The study of Zn(II) adsorption was performed to achieve the optimum conditions for the parameters of pH, adsorbent weight, contact time, and initial concentration of metals ions. alginate-chitosan nanoparticles before Zn(II) adsorption and alginate-chitosan nanoparticles after Zn(II) adsorption was then tested for antibacterial activity with Gram-negative bacteria such as *Escherichia coli* and Gram-positive such as *Staphylococcus aureus*.

The results showed that synthesis of alginate-chitosan nanoparticles has been successful in the form of coarse solid powder and ivory white. The TEM image shows average particle size of 8.31 nm. The optimum condition for Zn(II) adsorption by alginate-chitosan nanoparticles were obtained at pH 6, adsorbent weight of 0.07 g, adsorption contact time of 90 minutes, and initial concentration of 16 ppm. The study of adsorption kinetics showed that the adsorption process followed the pseudo-second order with the value of adsorption rate constant is 0.120 g/mg menit. The adsorption isotherm showed that the adsorption process followed the Dubinin-Radushkevich model with a free energy of 912.9 kJ/mol which indicates that the adsorption process takes place chemisorption. Alginate-chitosan-Zn nanoparticles has bacteriostatic properties.

Keyword: alginate-chitosan, antibacteria, Zn(II)