

**ANALISIS KEMAMPUAN ADSORPSI & KARAKTERISASI *BEADS*
KOMPOSIT PATI-KITOSAN-NANOSELULOSATERHADAP LOGAM
BERAT TIMBAL (Pb)**

Oleh

Ni Putu Ayu Werdhianty NIM 2113081030

Program Studi Kimia

ABSTRAK

Penelitian ini bertujuan untuk menganalisis kemampuan *beads* komposit pati-kitosan-nanoselulosa sebagai adsorben logam Pb. Lebih spesifik untuk mengetahui kondisi optimum dan efisiensi adsorpsi logam Pb serta karakteristik *beads* komposit pati-kitosan-nanoselulosa sebelum dan sesudah adsorpsi. Penelitian dilaksanakan secara bertahap dengan pembuatan *beads* komposit pati-kitosan-nanoselulosa, pembuatan kurva standar logam Pb, dan proses adsorpsi logam Pb; Adapun variasi perlakuan adsorpsi yaitu pH (3,4,5,6,7,8,9,10), waktu kontak (0,30,60,90,dan 120) menit, dan kapasitas adsorpsi *beads* terhadap logam Pb. Hasil adsorpsi logam Pb terbaik dengan menggunakan *beads* komposit pati-kitosan-nanoselulosa terbaik kemudian di analisis menggunakan AAS, analisis gugus fungsi menggunakan FTIR dan analisis morfologi menggunakan SEM. Hasil analisis menunjukkan bahwa pH optimum adsorpsi pada pH 8 yang mampu mengadsorpsi ion logam sebesar 89,799%. Waktu kontak optimum adsorpsi Pb adalah 60 menit dengan persentase adsorpsi 79,802%. Konsentrasi optimum adsorpsi logam Pb pada konsentrasi 100 mg/L sebesar 95,79%. Pola isoterm adsorpsi logam berat Pb dengan menggunakan *beads* komposit-pati-kitosan-nanoselulosa mengikuti model isoterm Freundlich. Analisis FTIR memperlihatkan gugus fungsi *beads* komposit pati-kitosan-nanoselulosa setelah adsorpsi pada pH optimum tidak mengalami pergeseran yang signifikan, sedangkan pada perlakuan waktu optimum mengalami pergeseran pada beberapa gugus fungsi. Morfologi permukaan dari *beads* komposit pati-kitosan-nanoselulosa, secara kualitatif memiliki rongga yang lebih banyak pada sebelum proses adsorpsi dan terlihat tertutup setelah proses adsorpsi.

Kata Kunci: *adsorpsi, beads, pati, kitosan, nanoselulosa.*

**ANALYSIS OF ADSORPTION CAPABILITY AND
CHARACTERIZATION OF NANOCELLULOSE CHITOSAN STARCH
COMPOSITE BEADS ON THE HEAVY METAL LEAD (Pb)**

by

Ni Putu Ayu Werdhianty NIM 2113081030

Chemistry Study Program

ABSTRACT

This study aims to analyze the ability of starch-chitosan-nanocellulose composite beads as Pb metal adsorbents. More specifically to determine the optimum conditions and efficiency of Pb metal adsorption and the characteristics of starch-chitosan-nanocellulose composite beads before and after adsorption. The study was carried out in stages by making starch-chitosan-nanocellulose composite beads, making Pb metal standard curves, and Pb metal adsorption processes; The variations in adsorption treatment are pH (3,4,5,6,7,8,9,10), contact time (0,30,60,90, and 120) minutes, and the adsorption capacity of beads to Pb metal. The best Pb metal adsorption results using the best starch-chitosan-nanocellulose composite beads were then analyzed using AAS, functional group analysis using FTIR and morphology analysis using SEM. The results of the analysis showed that the optimum pH for adsorption was at pH 8 which was able to adsorb metal ions by 89.799%. The optimum contact time for Pb adsorption was 60 minutes with an adsorption percentage of 79.802%. The optimum concentration of Pb metal adsorption at a concentration of 100 mg/L was 95.79%. The isotherm pattern of Pb heavy metal adsorption using starch-chitosan-nanocellulose composite beads followed the Freundlich isotherm model. FTIR analysis showed that the functional groups of starch-chitosan-nanocellulose composite beads after adsorption at optimum pH did not experience a significant shift, while at optimum time treatment there was a shift in several functional groups. The surface morphology of starch-chitosan-nanocellulose composite beads qualitatively had more cavities before the adsorption process and appeared closed after the adsorption process.

Keyword: *adsorption, beads, starch-chitosan-nanocellulose*