ADSORPSI OKSITETRASIKLIN MENGGUNAKAN *NANOFIBER* POLIAKRILONITRIL (PAN)/BIOCHAR OKARA

INTISARI

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Fabrikasi elektrospining *nanofiber* biochar okara telah dilakukan untuk mengadsorpsi oksitetrasiklin (OTC) di lingkungan akuatik. Biochar merupakan material karbon dengan banyak gugus aromatis sehingga dapat dijadikan adsorben limbah OTC. Riset ini bertujuan untuk mengevaluasi pengaruh penambahan biochar terhadap morfologi dan kapasitas adsorpsi *nanofiber* untuk adsorpsi OTC. Biochar ditambahkan dalam larutan PAN dan dielektrospining pada tegangan arus 10 kV. Adisi biochar okara dapat meningkatkan konduktivitas larutan dan menurunkan viskositas larutan sehingga mempengaruhi morfologi permukaan *nanofiber*. Karakterisasi SEM dan XPS mengkonfirmasi keberhasilan metode elektrospining untuk mengembankan biochar dalam *nanofiber*. Integrasi biochar menaikkan kapasitas adsorpsi dari 20,0333 menjadi 178,1181 g mg^{-1}. Karakterisasi FTIR menunjukkan proses adsorpsi berlangsung melalui interaksi π-π, interaksi elektrostatik, dan *pore filling*. Adsorpsi OTC oleh *nanofiber* biochar okara mengikuti kinetika orde kedua semu (*pseudo second order*/PSO) serta isoterm Freundlich dan Harkin-Jura. Implementasi metode *Response surface methodology – box behnken design* (RSM-BBD) untuk optimasi parameter adsorpsi OTC pada *nanofiber* biochar okara menghasilkan kondisi yang mirip dengan metode konvensional (*batch*) sehingga metode RSM-BBD dapat dijadikan alternatif metode optimasi kondisi adsorpsi.

Kata kunci: Elektrospining, *Nanofiber*, Biochar, Okara (Ampas Tahu), Oksitetrasiklin (OTC)

OXYTETRACYCLINE ADSORPTION BY ELECTROSPUN NANOFIBERS POLYACRYLONITRILE (PAN)/BIOCHAR OKARA

ABSTRACT

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Fabrication of electrospun nanofibers biochar okara has been conducted to eliminate oxytetracycline (OTC) in aquatic environment. Biochar is a carbon material with abundant aromatic groups which easily interact with OTC. This research aims to evaluate the effect of biochar addition on the morphology and adsorption capacity of nanofibers biochar okara for OTC removal. Biochar was added in PAN solution and electrospun at a current voltage of 10 kV. Impregnation of biochar okara can increase the conductivity of the solution and decrease the viscosity of the solution, thus affecting the surface morphologies of the nanofibers. SEM and XPS characterization confirmed the success of electrospinning method to embed biochar into nanofibers. The integration of biochar increased the adsorption capacity from 20.0333 to 178.1181 g mg^{-1}. FT-IR and Surface Area Analyzer characterization suggested that the adsorption process took place through π-π interaction, electrostatic interaction, and pore filling. OTC adsorption by nanofibers biochar okara followed pseudo second order (PSO) kinetics also Freundlich and Harkin-Jura isotherms. Implementation of Response surface methodology - box behnken design (RSM-BBD) method for adsorption optimization resulted in similar conditions to the conventional (batch) method indicated the RSM-BBD method can be used as an alternative method of optimizing adsorption conditions.

Keywords: Elektrospinning, Nanofibers, Biochar, Okara (Soybean dreg), oxytetracycline (OTC)