

**SINTESIS NANOFIBER POLIVINIL ALKOHOL /KITOSAN
DAN POLIVINIL ALKOHOL/KITOSAN/SiO₂
SEBAGAI ADSORBEN [AuCl₄]⁻**

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INTISARI

Nanofiber polivinil alkohol/kitosan dan polivinil alkohol/kitosan/SiO₂ sebagai adsorben [AuCl₄]⁻ telah berhasil disintesis. Nanofiber disintesis melalui metode *electrospinning* menggunakan perbandingan volume PVA:Kitosan (8:1) dan penambahan SiO₂ 0,2 gram. Nanofiber dikarakterisasi menggunakan SEM, FTIR dan XRD. Parameter pengujian terhadap kemampuan adsorpsi nanofiber meliputi variasi pH, waktu kontak, variasi konsentrasi, kinetika adsorpsi dan isotherm adsorpsi. Analisis SEM, FTIR dan XRD untuk mengetahui morfologi permukaan, gugus fungsional serta puncak difraksi nanofiber.

Data SEM menunjukkan bahwa nanofiber PVA/Kitosan dan PVA/Kitosan/SiO₂ telah berhasil disintesis berdasarkan terbentuknya ukuran serat seragam pada perbesaran 25000×. Data spektra FTIR menunjukkan vibrasi tekuk pada daerah 1651 cm⁻¹ yang mengindikasikan keberadaan -NH₂, vibrasi pada 1095 cm⁻¹ merupakan vibrasi ulurSi-O-Si (siloksan). Data XRD nanofiber PVA/Kitosan dan PVA/Kitosan/SiO₂ setelah adsorpsi menunjukkan adanya puncak difraksi pada 2θ = 19,9° (kitosan); 2θ = 29,12° (SiO₂); 2θ = 38,21°; 42,97° dan 64,49° (Au). Adsorpsi optimum ion [AuCl₄]⁻ oleh nanofiber PVA/Kitosan dan PVA/Kitosan/SiO₂ terjadi pada pH 6, waktu optimum masing-masing 50 menit dan 40 menit serta konsentrasi optimum pada 40 mg L⁻¹. Adsorpsi [AuCl₄]⁻ pada nanofiber PVA/Kitosan dan PVA/Kitosan/SiO₂ mengikuti isotherm Freundlich, dengan kapasitas adsorpsi maksimum masing-masing 0,072 dan 4,539 mg g⁻¹, konstanta Freundlich (n) 0,54 dan 1,67; koefisien korelasi R² 0,939 dan 0,937. Kinetika adsorpsi mengikuti orde kedua semu (Ho dan McKay) dengan laju adsorpsi untuk nanofiber PVA/Kitosan dan PVA/Kitosan/SiO₂ berturut-turut 5,4 x10⁻⁴ dan 1,0 x 10⁻⁴ g mg⁻¹ menit⁻¹.

Kata kunci: nanofiber, isotherm Freundlich, adsorpsi, [AuCl₄]⁻.

**SYNTHESIS OF POLYVINYL ALCOHOL/CHITOSAN
AND POLYVINYL ALCOHOL/CHITOSAN/SiO₂ NANOFIBER FOR
THE ADSORBENT OF [AuCl₄]⁻**

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ABSTRACT

Polyvinyl alcohol/chitosan and polyvinyl alcohol/chitosan/SiO₂ nanofibers for the adsorbent of [AuCl₄]⁻ have been made. Nanofiber have been obtained by electrospinning method using volume ratio of PVA:chitosan (8:1) and 0,2 gram of SiO₂. The nanofibers then characterized by SEM, FTIR and XRD. Several parameters examined in this study, includes: variation of pH, contact time, variation of concentration, adsorption kinetics and adsorption isotherms. The SEM, FTIR and XRD data showed the topograph of nanofibers surface, functional groups and diffraction peak of nanofibers.

SEM results showed that the nanofibers have been successfully synthesized based on formation of the same fiber size with magnification 25000×. FTIR spectra showed the bending vibration of nanofibers at 1651 cm⁻¹, which indicated the existence of -NH₂, stretching vibration at 1095 cm⁻¹ was Si-O-Si (siloxane) functional group. XRD analysis showed that diffraction peak at 2θ = 19.9° (chitosan); 2θ = 29.12° (SiO₂); 2θ = 38.21°; 42.97° and 64.49° (Au). PVA/chitosan and PVA/chitosan/SiO₂ nanofibers displayed optimum adsorption for [AuCl₄]⁻ at pH 6, optimum time at 50 and 40 minutes, respectively; the optimum concentration at 40 mg L⁻¹. Adsorption of [AuCl₄]⁻ by PVA/chitosan and PVA/chitosan/SiO₂ followed Freundlich isotherm, with optimum adsorption capacity 0.072 and 4.539 mg g⁻¹, Freundlich constant (n) counted 0.54 and 1.67; coefficient correlation (R²) counted 0.939 and 0.937, respectively. Kinetics adsorption followed pseudo second order by Ho and McKay, the adsorption rate of PVA/chitosan and PVA/chitosan/SiO₂ nanofibers counted 5.4 x 10⁻⁴ and 1.0 x 10⁻⁴ g mg⁻¹ minutes⁻¹, respectively.

Keywords: nanofiber, Freundlich isotherm, adsorption, [AuCl₄]⁻.