

SINTESIS Ni-Zn LHS (*NICKEL-ZINC LAYERED HYDROXIDE SALTS*) TERIMOBILISASI ASAM SITRAT SEBAGAI ADSORBEN [AuCl₄]⁻

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INTISARI

Sintesis Ni-Zn LHS (*Nickel-Zinc Layered Hydroxide Salts*) terimobilisasi asam sitrat dan pengujian kualitas sebagai adsorben [AuCl₄]⁻ telah dilakukan. Sintesis material utama berupa Ni-Zn LHS dilakukan dengan mencampurkan Ni(NO₃)₂ dengan Zn(NO₃)₂ (rasio molar 2:1) kemudian ditetaskan dengan NaOH (0,75 M) pada pH 7,3 sebanyak 32 mL menggunakan metode kopresipitasi yang diaduk selama 60 menit. Ni-Zn LHS dengan larutan NaOH 32 mL dipilih dalam studi imobilisasi karena didasarkan pada kristalinitas dan kemurniannya. Asam sitrat kemudian diimobilisasi pada Ni-Zn LHS hasil sintesis pada kondisi optimum yaitu pada konsentrasi asam sitrat 200 mg L⁻¹ dan pH optimum 7. Untuk membuktikan keberhasilan imobilisasi asam sitrat pada senyawa hasil sintesis dilakukan analisis dengan spektrometer FTIR, XRD dan SEM sebelum dan sesudah imobilisasi.

Berdasarkan hasil penelitian diperoleh senyawa Ni-Zn-LHS-AS berupa padatan berwarna hijau. Spektra FTIR Ni-Zn-LHS-AS menunjukkan keberadaan puncak vibrasi karakteristik pada bilangan gelombang 1481 cm⁻¹ yang merupakan vibrasi gugus C-H pada asam sitrat. Pengujian performa Ni-Zn-LHS-AS sebagai adsorben [AuCl₄]⁻ diantaranya optimasi pH, waktu kontak, kinetika adsorpsi dan kajian isoterm adsorpsi. Adsorpsi [AuCl₄]⁻ oleh Ni-Zn-LHS-AS optimum pada pH 3. Adsorpsi [AuCl₄]⁻ terbukti mengikuti model kinetika adsorpsi pseudo orde kedua Ho dengan tetapan laju adsorpsi (k) sebesar 1,53 x 10⁻³ g mg⁻¹ menit⁻¹. Berdasarkan profil isoterm adsorpsi [AuCl₄]⁻ terbukti sesuai dengan model isoterm Freundlich dengan kapasitas adsorpsi [AuCl₄]⁻ yakni sebesar 1,37 mg g⁻¹. Berdasarkan hasil kuantitatif diketahui material Ni-Zn-LHS-AS terimobilisasi asam sitrat mempunyai performa yang baik untuk adsorpsi [AuCl₄]⁻.

Kata kunci : Ni-Zn LHS, imobilisasi, asam sitrat, adsorpsi, [AuCl₄]⁻

SYNTHESIS OF CITRIC ACID IMMOBILIZED Ni-Zn LHS (NICKEL-ZINC LAYERED HYDROXIDE SALTS) AS ADSORBENT OF [AuCl₄]⁻

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ABSTRACT

Synthesis of citric acid immobilized Ni-Zn LHS (Nickel-Zinc Layered Hydroxide Salts) and the quality assay as adsorbent of [AuCl₄]⁻ have been carried out. Ni-Zn LHS was synthesized by mixing Ni(NO₃)₂ with Zn(NO₃)₂ (2:1 molar ratio) then dropped with 32 mL of NaOH (0,75 M) using coprecipitation method for 60 minute. 32 mL NaOH solution has been selected which is based on crystallinity and purity of the produced Ni-Zn LHS. The synthesis result was carried out for immobilized with citric acid on optimum concentration and pH which was 200 mg L⁻¹ and pH 7. To prove the success of synthesis before and after immobilization were confirmed by FTIR spectrophotometer, XRD and SEM.

Based on the result, Ni-Zn-LHS-AS were obtained as green solid. The FTIR spectra of Ni-Zn-LHS-AS showed the presence of characteristic vibration peaks at 1481 cm⁻¹ which is C-H from citric acid. Performance assay of Ni-Zn-LHS-AS as adsorbent for [AuCl₄]⁻ such as pH optimal, contact time, adsorption kinetic and isotherm have been examined. The result showed that pH 3 was the optimum acidity for the adsorption of [AuCl₄]⁻. [AuCl₄]⁻ adsorption was proved onto Ni-Zn-LHS-AS followed Ho pseudo second order kinetics with adsorption rate constant was 1,53 x 10⁻³ g. mg⁻¹ minute⁻¹. Adsorption [AuCl₄]⁻ of Ni-Zn-LHS-AS was followed the Freundlich isotherm model with adsorption capacity was 1,37 mg g⁻¹. Based on the result obtained, it is known that Ni-Zn-LHS-AS has good performance for adsorption of [AuCl₄]⁻.

Keywords : Ni-Zn LHS, immobilization, citric acid, adsorption, [AuCl₄]⁻