

**SINTESIS MATERIAL Ni-Zn LHS (LAYERED HYDROXIDE SALT)
MENGGUNAKAN METODE KOPRESIPITASI YANG TERIMOBILISASI
ASAM ASKORBAT SEBAGAI ADSORBEN [AuCl₄]⁻**

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INTISARI

Dalam beberapa tahun terakhir terjadi peningkatan jumlah limbah elektronik akibat adanya *update* dalam kemajuan teknologi. Limbah elektronik mengandung beberapa logam berharga, salah satunya adalah logam emas. Emas dapat diperoleh kembali dengan metode adsorpsi. Ni-Zn LHS adalah material berlapis yang banyak digunakan dalam adsorpsi logam. Modifikasi berupa imobilisasi dilakukan terhadap material untuk meningkatkan aktivitas adsorben. Dalam menentukan keberhasilan imobilisasi asam askorbat dan adsorpsi [AuCl₄]⁻, adsorben dikarakterisasi dengan XRD, FTIR dan SEM-EDX.

Telah disintesis material Ni-Zn LHS terimobilisasi asam askorbat (Ni-Zn-AA LHS) sebagai adsorben [AuCl₄]⁻. Sintesis material Ni-Zn LHS menggunakan metode kopresipitasi dengan mencampurkan 3,33 mL Ni(NO₃)₂ 3,5 M dan 1,67 mL Zn(NO₃)₂ 3,5 M serta penambahan basa NaOH 0,75 M sebanyak 14 mL. Karakterisasi material Ni-Zn LHS hasil sintesis dengan instrumen XRD menunjukkan munculnya puncak pada bidang (001), (002), (003), (020) dan (220), vibrasi gugus fungsi dari bahan penyusun material yang muncul pada bilangan gelombang 3448, 1627, 1381, 871, 655 dan 470 cm⁻¹ dan morfologi material berupa bongkahan menurut citra SEM. Material Ni-Zn LHS sebanyak 10 mg selanjutnya diimobilisasi dengan asam askorbat pada kondisi optimum pH=6 dan konsentrasi 120 mg L⁻¹. Imobilisasi asam askorbat terhadap material Ni-Zn LHS mengikuti model isotherm Langmuir dengan kapasitas adsorpsi sebesar 73,53 mg g⁻¹.

Material Ni-Zn-AA LHS sebanyak 10 mg diaplikasikan sebagai adsorben [AuCl₄]⁻ dengan konsentrasi optimum 150 mg L⁻¹ pada pH=6 selama 120 menit. Proses adsorpsi [AuCl₄]⁻ oleh material Ni-Zn-AA LHS mengikuti model kinetika adsorpsi orde dua semu dengan koefisien korelasi 0,9959 dan konstanta laju adsorpsi sebesar 0,0089 g mg⁻¹ menit⁻¹. Koefisien korelasi untuk model isotherm Langmuir dan Freundlich berturut-turut 0,7933 dan 0,9924. Berdasarkan model isotherm Freundlich, kapasitas adsorpsi material Ni-Zn-AA LHS dalam menyerap [AuCl₄]⁻ sebesar 2,08x10⁻³ mg g⁻¹.

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

SYNTHESIS OF ASCORBIC ACID IMMOBILIZED Ni-Zn LHS (LAYERED HYDROXIDE SALT) MATERIAL USING COPRECIPITATION METHOD AS [AuCl₄]⁻ ADSORBENT

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ABSTRACT

In the last decade, the amount of electronic wastewater was increasing due to the update of technology advances. Electronic wastewater contains several precious metals, such as gold. Gold can be recovered by adsorption method. Ni-Zn LHS is layered material that has been widely used as metal adsorbent. Immobilization was done to the adsorbent to increase the activity of Ni-Zn LHS. The successful of ascorbic acid immobilizing and [AuCl₄]⁻ adsorption process was confirmed by XRD, FTIR and SEM-EDX characterization.

Ascorbic acid immobilized Ni-Zn LHS (Ni-Zn-AA LHS) material has been synthesized as [AuCl₄]⁻ adsorbent. The synthesis of Ni-Zn LHS was done through the coprecipitation method by mixing 3.33 mL of 3.5 M of Ni(NO₃)₂ and 1.67 mL of 3.5 M of Zn(NO₃)₂ then 14 mL of NaOH 0.75 M added onto the mixture. The show of peak on plane (001), (002), (003), (020) and (220) was obtained by XRD, functional group vibrations on wave number 3448, 1627, 1381, 871, 655 and 470 cm⁻¹ and wide range of particles size by SEM imaging were confirmed the characterization of Ni-Zn LHS. Ascorbic acid with concentration 120 mg L⁻¹ has been immobilized into 10 mg of Ni-Zn LHS under pH=6. The immobilizing process followed Langmuir isotherm adsorption model with adsorption capacity 73,53 mg g⁻¹.

The adsorption of [AuCl₄]⁻ by 10 mg of Ni-Zn-AA LHS was optimum upon the utilization of 150 mg L⁻¹ [AuCl₄]⁻ at pH=6 for 120 minutes. The adsorption of [AuCl₄]⁻ followed pseudo second order kinetic model with correlation coefficient and adsorption rate constant respectively 0.9959 and 0.0089 g mg⁻¹ menit⁻¹, respectively. The correlation coefficient of Langmuir and Freundlich adsorption isotherm model were 0.7933 dan 0.9924, respectively. The adsorption capacity of Ni-Zn-AA LHS determined according the Freundlich isotherm model was 2,08x10³ mg g⁻¹.

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