SINTESIS *ZINC LAYERED HYDROXIDE SALTS* (Zn-LHS) SEBAGAI ADSORBEN METIL JINGGA

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INTISARI

Sintesis *Zinc Layered Hydroxide Salts* (Zn-LHS) sebagai adsorben metil jingga (*Methyl Orange*, MO) telah dilakukan. Dua jenis Zn-LHS telah disintesis, dengan jenis yang pertama disintesis menggunakan metode kopresipitasi dan jenis yang kedua disintesis dengan metode *grinding.* Zn-LHS yang dihasilkan dianalisis menggunakan XRD untuk mengetahui kristalinitas dari Zn-LHS. Analisis FTIR bertujuan untuk identifikasi gugus fungsi, sedangkan SEM-EDX digunakan untuk analisis permukaan Zn-LHS sebelum dan setelah adsorpsi. Parameter pengujian kualitas Zn-LHS sebagai adsorben MO di antaranya kestabilan Zn-LHS dalam medium asam dan basa, pengaruh keasaman medium terhadap adsorpsi MO, pengaruh waktu kontak, kinetika adsorpsi, isoterm adsorpsi, dan kajian kinetika desorpsi.

Zn-LHS dengan rasio mol OH/Zn 0,6 dipilih sebagai adsorben dalam studi adsorpsi, pemilihan tersebut didasarkan pada faktor kristalinitas dan kemurnian. Kenaikan persentase massa unsur C dan N dalam analisis SEM-EDX setelah adsorpsi membuktikan bahwa MO teradsorpsi pada material Zn-LHS. Pergeseran puncak vibrasi –OH pada spektra FTIR Zn-LHS (metode kopresipitasi dan *grinding*) setelah adsorpsi mendukung hasil analisis SEM-EDX terhadap material Zn-LHS. Hasil penelitian menunjukkan bahwa pH 3 merupakan pH optimum adsorpsi MO. Adsorpsi MO pada Zn-LHS metode kopresipitasi dan metode *grinding* mengikuti adsorpsi pseudo orde kedua Ho dengan tetapan laju adsorpsi masing-masing sebesar 19965,3 g mol^{-1} $menit^{-1}$ dan 18394,4 g mol^{-1} $menit^{-1}$. Berdasarkan model isoterm Langmuir, kapasitas adsorpsi MO pada Zn-LHS metode kopresipitasi dan metode *grinding* masing-masing sebesar $6{,}40 \times 10^{-5}$ mol g^{-1} dan $1{,}13 \times 10^{-4}$ mol g^{-1}. Kinetika desorpsi MO dari Zn-LHS metode kopresipitasi dan metode *grinding* mengikuti kinetika pseudo orde kedua Ho dengan konstanta laju desorpsi sebesar 3699,5 g mol^{-1} $menit^{-1}$ dan 4636,0 g mol^{-1} $menit^{-1}$.

Kata kunci : Zn-LHS, kopresipitasi, *grinding*, adsorpsi, MO.

SYNTHESIS OF ZINC LAYERED HYDROXIDE SALTS (Zn-LHS) FOR THE ADSORBENT OF METHYL ORANGE

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ABSTRACT

Synthesis of Zn-LHS for the adsorbent of methyl orange (MO) has been done. Two types of Zn-LHS have been synthesized with the first type was obtained by coprecipitation method and the second type was obtained by grinding method. Crystallinity of Zn-LHS was analyzed by XRD and functional groups of Zn-LHS were identified using FTIR, in addition. The surface morphology of Zn-LHS before and after adsorption were analyzed by SEM-EDX. Some parameters that represented the quality of Zn-LHS such as stability in medium acidity, pH condition for MO adsorption, contact time, adsorption kinetics, adsorption isotherm and desorption kinetics have been examined.

Based on crystallinity and purity of the produced Zn-LHS, mole ratio of OH/Zn 0.6 has been selected. The increasing of mass percentage of C and N in SEM-EDX analysis after adsorpstion proved that MO was adsorbed onto Zn-LHS. A shifting of –OH vibration peak at FTIR spectra of Zn-LHS after adsorption (coprecipitation and grinding methods) supported the result of SEM-EDX analysis. The result showed that pH 3 was the optimum acidity for the adsorption of MO. MO adsorption onto Zn-LHS from coprecipitation and grinding methods followed Ho pseudo second order kinetics with adsorption rate constant of 19965.3 g mol^{-1} s^{-1} and 18394.4 g mol^{-1} s^{-1}, respectively. Based on Langmuir isotherm, adsorption capacity for Zn-LHS coprecipitation and grinding methods were 6.40×10^{-5} mol g^{-1} and 1.13×10^{-4} mol g^{-1}, respectively. Desorption kinetics of MO from both Zn-LHS followed Ho pseudo second order kinetics with desorption rate constant of 3699.5 g mol^{-1} s^{-1} for Zn-LHS coprecipitation method and 4636.0 g mol^{-1} s^{-1} for Zn-LHS grinding method.

Keywords : Zn-LHS, coprecipitation, grinding, adsorption, MO.