

ZEOLIT/LEMPUNG/CaO/PVA/KARBON AKTIF SEBAGAI KOMPOSIT ENKAPSULATOR PELEPAS-LAMBAT PUPUK UREA

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INTISARI

Telah dipelajari pengaruh polivinil alkohol (PVA) dan karbon aktif dalam komposit zeolit/lempung/CaO/PVA/karbon aktif sebagai enkapsulator pelepas-lambat pupuk urea. Tujuan penelitian ini adalah mempelajari pengaruh PVA dan karbon aktif terhadap kekuatan komposit enkapsulator dan mempelajari kinetika pelepasan pupuk urea dari enkapsulator komposit di dalam air. Komposit zeolit/lempung/CaO/PVA/karbon aktif dibuat dengan melakukan variasi pada komposisi PVA dan karbon aktif, kemudian diuji sifat fisiknya melalui uji kuat tekan, porositas, dan kestabilan dalam air, serta karakterisasi menggunakan XRD dan FTIR. Komposit zeolit/lempung/CaO/karbon aktif dengan komposisi terbaik dibentuk menjadi enkapsulator silinder sebagai pelepas-lambat pupuk urea.

Hasil penelitian menunjukkan bahwa PVA dan karbon aktif meningkatkan kuat tekan dan menurunkan porositas komposit. Kestabilan bentuk komposit dalam air dipengaruhi oleh PVA sehingga komposit zeolit/lempung/CaO/PVA/karbon aktif tetap utuh selama 30 hari. Komposit zeolit/lempung/CaO/PVA/karbon aktif dapat berperan sebagai sebagai enkapsulator pelepas-lambat pupuk urea yang sejalan dengan kinetika orde kedua semu dengan konstanta laju lepas-lambat sebesar $1,397 \times 10^{-2} \text{ L g}^{-1} \text{ jam}^{-1}$.

Kata kunci: karbon aktif, pupuk lepas-lambat, PVA.

ZEOLITE/CLAY/CaO/PVA/ACTIVATED CARBON AS THE ENCAPSULATOR COMPOSITES FOR UREA SLOW-RELEASE FERTILIZER

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ABSTRACT

The effect of polyvinyl alcohol (PVA) and activated carbon in zeolite/clay/CaO/PVA/activated carbon composites as a slow-release encapsulator for urea has been studied. This research aims to study the effect of PVA and activated carbon on the strength of the encapsulator composites and the kinetics of urea release in water. Zeolite/clay/CaO/PVA/activated carbon composites were made by varying the composition of PVA and activated carbon. The physical properties tests include compressive strength, porosity, and composite stability in water, then characterized using XRD and FTIR. The zeolite/clay/CaO/activated carbon composites composition with the best properties formed into a cylindrical encapsulator as a slow-release urea fertilizer.

The results showed that PVA and activated carbon increased the compressive strength and decreased the composites' porosity. The stability of the composite form in water is influenced by PVA, that the zeolite/clay/CaO/PVA/activated carbon composite remains intact for 30 days. The zeolite/clay/CaO/PVA/activated carbon composite can act as a slow-release encapsulator for urea according to pseudo-second-order kinetics with a slow-release rate constant of $1.397 \times 10^{-2} \text{ L g}^{-1} \text{ hr}^{-1}$.

Keywords: activated carbon, PVA, slow-release fertilizer.