



## **SINTESIS PUPUK NPK LEPAS LAMBAT TERLAPIS ALGINAT/ZEOLIT**

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### **INTISARI**

Sintesis pupuk NPK lepas lambat terlapis alginat/zeolit telah dilakukan. Pupuk NPK dilapisi dengan cara merendam pupuk pada larutan alginat/zeolit pada suhu kamar dengan variasi rasio berat alginat/zeolit yaitu 3:0; 3:1; 3:2; 3:3; dan 3:4. Pupuk dikarakterisasi menggunakan spektroskopi inframerah dan difraktometer sinar-X. Jumlah N dan P yang terlepas dianalisis menggunakan spektrofotometer UV-Vis, sedangkan K yang terlepas dianalisis menggunakan spektroskopi serapan atom. Uji pelepasan NPK dilakukan pada media asam sitrat 0,33 M selama 9 hari.

Spektra FTIR pupuk NPK terlapis alginat/zeolit menunjukkan gugus fungsi yang muncul dalam spektra inframerah komposit didominasi dari gugus fungsi alginat dan zeolit. Difraktogram sinar-X menunjukkan bahwa meningkatnya berat zeolit pada material pelapis meningkatkan karakter mordenit dan klinoptilolit dalam komposit. Studi pelepasan NPK menunjukkan bahwa dengan meningkatnya berat zeolit pada material pelapis, jumlah NPK yang terlepas semakin kecil. Proses pelepasan NPK mengikuti kinetika pelepasan orde kedua semu. Pupuk NPK terlapis alginat/zeolit dengan rasio 3:4 memiliki laju pelepasan NPK paling rendah dengan konstanta laju pelepasan N, P, dan K nya berturut-turut  $3,34 \times 10^{-3}$ ;  $0,75 \times 10^{-2}$ ; dan  $0,93 \times 10^{-2} \text{ mg g}^{-1} \text{ jam}^{-1}$ .

Kata kunci: alginat, asam sitrat, pelapis, pupuk lepas lambat, zeolit



## ***SYNTHESIS OF SLOW RELEASE NPK FERTILIZER COATED BY ALGINATE/ZEOLITE***

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### **ABSTRACT**

The synthesis of slow release NPK fertilizer coated with alginate/zeolite has been performed. NPK fertilizer was coated by immersing the fertilizer to the coating mixture of alginate/zeolite in room temperature with variation of alginate/zeolite ratio 3:0; 3:1; 3:2; 3:3; and 3:4. The fertilizer was characterized by infrared spectroscopy and X-ray diffractometer. The released N and P were analyzed by using UV-visible spectrophotometer, while K was analyzed by using atomic absorption spectroscopy. The release of NPK was carried out in 0.33 M citric acid medium for 9 days.

The infrared spectra showed that the fertilizer was dominated by alginate and zeolite functional groups. X-ray diffractogram showed that the increasing zeolite weight in coating material increased the amount of mordenite and clinoptilolite in fertilizer. Release study of NPK showed that increasing zeolite weight in coating material decreased the amount of NPK released and the release process followed the pseudo second order kinetics. NPK fertilizer coated with alginate/zeolite with ratio 3:4 had the lowest release rate of NPK with the release rate constants  $3.34 \times 10^{-3}$ ;  $0.75 \times 10^{-2}$ ; and  $0.93 \times 10^{-2} \text{ mg g}^{-1} \text{ hour}^{-1}$ , respectively.

Keywords: alginate, citric acid, coating, slow release fertilizer, zeolite