

**PEMBUATAN KOMPOSIT BIOPLASTIK KARBOKSIMETIL
SELULOSA/ASAM SITRAT/LEMPUNG/N, P, K/PEROVSKIT MTiO₃ (M= Ba,
Sr) SEBAGAI MODEL PUPUK LEPAS-LAMBAT YANG BERSIFAT
ANTIBAKTERI**

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INTISARI

Pembuatan komposit bioplastik karboksimetil selulosa/asam sitrat/lempung/N, P, K/perovskit MTiO₃ (M= Ba, Sr) sebagai model pupuk lepas lambat yang bersifat antibakteri telah dilakukan. Penelitian ini bertujuan untuk memperoleh informasi pengaruh penambahan asam sitrat terhadap sifat mekanik dan daya serap air, penambahan perovskit MTiO₃ (M= Ba, Sr) terhadap sifat antibakteri bioplastik serta memperoleh informasi kinetika pelepasan pupuk N, P, K dari bioplastik. Metode yang digunakan dalam pembuatan bioplastik adalah metode *solvent casting* dengan menggunakan pengaduk magnet pada suhu ruang. Konsentrasi KMS, massa lempung dan massa N, P, K dibuat konstan. Konsentrasi asam sitrat divariasikan dari 0%, 1%, 2%, 3%, 4%, dan 5%, sedangkan konsentrasi MTiO₃ (M= Ba dan Sr) masing-masing divariasikan dari 0,05 ; 0,10 ; 0,20 dan 0,30 M. Bioplastik yang terbentuk dikarakterisasi menggunakan FTIR dan XRD, serta diuji sifat mekanik, daya serap air, sifat antibakteri serta dikaji pelepasan pupuk NPK dari bioplastik

Berdasarkan hasil penelitian diperoleh bahwa penambahan asam sitrat menurunkan nilai kuat tarik tetapi penambahan asam sitrat 3% memiliki persen elongasi paling tinggi. Penambahan perovskite oksida (MTiO₃) (M= Ba dan Sr) dalam bioplastik menunjukkan adanya aktivitas daya hambat yang kuat terhadap bakteri *Ralstonia solanacearum* maupun *Pseudomonas sp.* Kinetika pelepasan pupuk N, P, K dari bioplastik KMS/AS/lempung/NPK, KMS/AS/lempung/NPK/BaTiO₃ dan KMS/AS/lempung/NPK/SrTiO₃ mengikuti model kinetika orde kedua semu, Higuchi dan Krossmeyer-Peppas.

Kata kunci: KMS, AS, lempung, perovskite oksida (MTiO₃).

***PREPARATION OF BIOPLASTIC COMPOSITE CARBOXYMETHYL
CELLULOSE/CITRIC ACID/CLAY/N, P, K/PEROVSKITE MTiO₃ (M= Ba, Sr)
AS A MODEL OF SLOW-RELEASE FERTILIZER WITH ANTIBACTERIAL
ACTIVITY***

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ABSTRACT

Preparation of bioplastic composite carboxymethyl cellulose/citric acid/clay/N, P, K/perovskite MTiO₃ (M= Ba, Sr) as a model of slow-release fertilizer with antibacterial activity has been carried out. The research aimed to obtain information about the effect of citric acid addition on the mechanical properties and swelling of bioplastics, the kinetic models of slow-release NPK, and the effect of perovskite MTiO₃ (M= Ba, Sr) addition for the antibacterial activity of bioplastics. The solvent casting method is used in this research. The preparation of bioplastic was made at room temperature using a magnetic stirrer. The concentration of carboxymethyl cellulose (KMS), the mass of clay, and NPK were kept constant. The citric acid (AS) concentration varied from 1%, 2%, 3%, 4%, and 5%, while the concentration of perovskite MTiO₃ (M= Ba, Sr) varied from 0,05 ; 0,10 ; 0,20 ; 0,30 M. The bioplastics composite formed was characterized by FTIR and XRD, mechanical test, swelling test, antibacterial activity, and the release of NPK fertilizer from the bioplastics studied.

The result showed the addition of AS in bioplastics composition decreased the tensile strength value but the addition of 3% citric acid had the highest percentage of elongation. The addition of perovskite MTiO₃ (M= Ba, Sr) in bioplastic composition showed a strong inhibitory activity pathogen *Ralstonia solanacearum* and nonpathogen *Pseudomonas sp.* The kinetic model of slow-release N, P, K for bioplastics composites KMS/AS/clay/NPK, KMS/AS/clay/NPK/BaTiO₃, KMS/AS/clay/NPK/SrTiO₃ followed pseudo second order, Higuchi and Krossmeyer-Peppas.

Keyword: KMS, AS, clay, perovskite MTiO₃ (M= Ba, Sr)