INTISARI

PERILAKU *SLOW-RELEASE FERTILIZER* PADA MEMBRAN NANOFIBER *POLYVINYL ALCOHOL* (PVA)/UREA/TiO_2

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Pembuatan *slow-release nanofiber* PVA/Urea/TiO_2 telah berhasil dilakukan dengan metode fabrikasi *electrospinning*. Membran *slow-release* PVA/Urea/Tio_2 dibuat dengan variasi konsentrasi larutan suspensi TiO_2 (0; 0,2; 0,4mL) dan variasi massa urea (10,15 dan 20% terhadap massa PVA). Masing-masing sampel kemudian dikarakterisasi menggunakan SEM dan FTIR, serta diuji dengan uji sudut kontak dan uji *slow-release*. Seluruh sampel menunjukan dapat membentuk nanofiber, serta terdapat gugus nitrogen pada matriksnya. Keberdaan TiO_2 dikonfirmasi dengan citra SEM *Mapping*. Data hasil uji sudut kontak menunjukan kesemua sampel bersifat hidrofilik (sudut kontak<90^o). Uji *slow -release* menggunakan metode relasi absorbansi dan konsentrasi berdasarkan hukum Lamber-Beer, ditemukan bahwa sampel dengan variasi urea terbanyak (0,4mL) memiliki waktu *release* urea yang paling lama yakni 8 hari menunjukan sifat hidrofobik urea yang dapat menekan hidofilitas membran PVA, serta penambahan urea menambah hidrofilitas membran yang mempercepat laju *release.* Berdasarkan model kinetik matematis Korsmeyer-Peppas didapatkan mekanisme *drug-release* dari membran dipicu fenomena erosi pada badan matriks nanofiber.

Kata Kunci: *Slow-Release Fertilizer*, *Nanofiber*, PVA/ TiO_2/ Urea, Elektrospining

Abstract

SLOW-RELEASE FERTILIZER BEHAVIOR OF MEMBRANE NANOFIBER POLYVINYL ALCOHOL (PVA)/UREA/TiO_2

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Slow-release PVA/Urea/TiO_2 nanofibers have been successfully fabricated using the electrospinning fabrication technique. Different urea mass concentrations (10.15 and 20% of PVA mass) and titanium dioxide suspension solution concentrations (0, 0.2, and 0.4 mL) were used to make PVA/Urea/TiO_2 slow-release membranes. Following that, each sample was examined using SEM and FTIR characterisation and assessed using a contact angle test and a slow-release test. All samples showed nanofiber formation capability, and the matrix contained nitrogen groups. The presence of titanium dioxide was confirmed by the SEM mapping pictures. The results of the contact angle test indicated that all samples were hydrophilic (contact angle>90^o). The sample with the highest urea variation (0.4 mL) was found to have the longest urea release period, which was 8 days, descriptive of urea's hydrophobic character, which could inhibit the hydrophilicity of the PVA membrane. Urea will make the membrane more hydrophilic, which quickens the rate of release. Based on the Korsmeyer-Peppas mathematical kinetic model, it was determined that the drug-release mechanism from the membrane is driven by erosion processes on the nanofiber matrix body.

Keywords: Nanofiber, PVA/ TiO_2/ Urea, Slow-Release Fertilizer, Electrospinning