

**MIKROENKAPSULASI UREA MENGGUNAKAN
BIOBLEND POLIMER POLISTIRENA –
POLI(3-HIDROKSIBUTIRAT)**

SKRIPSI SARJANA FARMASI

Oleh

RIA HUMMAM PRAMIBA

No. BP : 1411012042

PEMBIMBING 1 : Prpf. Dr. H. Elfi Sahlan Ben, Apt

PEMBIMBING 2 : Prof. Dr. Akmal Djamaan, MS, Apt



**FAKULTAS FARMASI
UNIVERSITAS ANDALAS
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ABSTRAK

Formulasi sediaan pupuk urea lepas lambat dengan teknik mikroenkapsulasi menggunakan bioblend polistirena dan poli(3-hidroksibutirat) telah dilakukan. Pembuatan mikrokapsul dilakukan menggunakan teknik emulsifikasi penguapan pelarut dengan perbandingan urea dan bioblend 1:1,5. Sementara perbandingan polistirena dan poli(3-hidroksibutirat) pada tiap formula adalah 85%:15%, 90%:10%, 95%:5%. Evaluasi mikrokapsul yang dihasilkan meliputi spektroskopi *Fourier Transform Infra Red* (FTIR), *Scanning Electron Microscope* (SEM), distribusi ukuran partikel, penetapan kadar urea dalam mikrokapsul, uji pelepasan, dan model kinetika pelepasan zat aktif. Hasil analisis FTIR menunjukkan bahwa tidak adanya interaksi kimia antara urea dan bioblend polistirena-poli(3- hidroksibutirat). Hasil SEM menunjukkan mikrokapsul yang dihasilkan berbentuk sferis. Perolehan kembali urea dalam mikrokapsul untuk formula 1, formula 2, dan formula 3 berturut-turut yaitu 74,88%, 81,944%, dan 76,16%. Mikrokapsul mempunyai distribusi ukuran partikel antara 0-0,2 μm . Model kinetika pelepasan zat aktif memenuhi persamaan Korsmeyer-Peppas. Persentase efisiensi pelepasan formula 1,2, dan 3 berturut-turut ialah $65,0497 \pm 1,464\%$, $71,7813 \pm 1,653\%$, dan $39,7843 \pm 0,722\%$. Hasil uji statistik menunjukkan efisiensi uji pelepasan memiliki signifikansi yang berbeda nyata ($<0,05$). Hal ini menunjukkan bahwa perbandingan konsentrasi bioblend dapat memengaruhi hasil pelepasan urea dari mikrokapsul. Hasil uji statistik juga menunjukkan efisiensi enkapsulasi memiliki signifikansi yang berbeda nyata ($<0,05$). Hal ini menunjukkan bahwa perbandingan konsentrasi bioblend dapat memengaruhi hasil pelepasan urea dari mikrokapsul.

Kata kunci : Urea, Mikrokapsul, Pupuk Lepas Lambat, Polistirena, Poli(3-Hidroksibutirat), Emulsifikasi Penguapan Pelarut.

ABSTRACT

Formulation of urea slow released fertilizers using polystyrene and poly(3-hydroxybutirate) bioblend as matrix by microencapsulation technique have been studied. Microcapsules were prepared by solvent evaporation method. The ratio of urea and bioblend were 1:1,5, while the ratio of polystyrene and poly(3-hydroxybutirate) were 85%:15%, 90%:10%, 95%:5% respectively. Evaluation of microcapsules included Fourier Transform Infra Red spectroscopy (FTIR), Scanning Electron Microscope (SEM), particle size distribution, amount of urea in microcapsules, release test, and release kinetic study. There was no chemical interaction between urea, polystyrene, and poly(3-hydroxybutirate). SEM showed that microcapsules were spherical in shape. The percentages of drug loading for formula 1, 2, and 3 were 74,88%, 81,944%, and 76,16%. Particle size distribution of urea microcapsules were 0-0,2 μm . The release kinetic model of urea from microcapsules followed Korsmeyer-Peppas equation. The percentage of dissolution efficiencies for each formulas were $65,0497 \pm 1,464\%$, $71,7813 \pm 1,653\%$, and $39,7843 \pm 0,722\%$. Statistical analysis using One Way ANOVA showed that dissolution efficiencies among formula were different significantly (<0.05). It concludes that the difference of bioblend ratio concentration could impact urea release from microcapsules. Statistical analysis using One Way ANOVA also showed that entrapment efficiencies among formula were different significantly (<0.05). It concludes that the difference of bioblend ratio concentration could impact urea entrapment in microcapsules.

Keywords : Urea, Microcapsule, Slow Release Fertilizer, Polystyrene, Poly(3-Hydroxybutirate) , Solvent Evaporation Method

