

ABSTRAK

Hidrogel yang disintesis dengan bahan dasar PVA-Glutaraldehida telah dikenal memiliki sifat *slow-controlled-release*, sehingga dipandang berpotensi untuk diaplikasikan dalam bidang pertanian. Walaupun telah cukup banyak penelitian dilakukan pada aspek sintesisnya, kinetika dan mekanisme *release* material dari hidrogel ini belum diketahui dengan jelas. Dalam penelitian ini dilakukan studi mengenai *release behavior* KCl dari hidrogel PVA:GA ke dalam aqua demineralisasi. Kandungan Kalium dalam aqua dianalisis dengan instrumen AAS. Cuplikan KCl dari dalam larutan diambil dalam rentang waktu yang ditentukan selama 420 menit. Data yang diperoleh kemudian dianalisis dengan beberapa pemodelan matematika *release material* yang telah umum digunakan (*fitting to current models*), meliputi: orde nol, orde satu, Higuchi, Hixson-Crowell, Hopfenberg, Weibull, dan Korsmeyer-Peppas. Komposisi optimum sintesis hidrogel diperoleh pada rasio volume PVA:GA = 1:1 dengan total volume 5 mL, dimana *swelling ratio* (SR%) mencapai 161% dalam waktu perendaman selama 240 menit. Hasil pengolahan data *release* menunjukkan bahwa kinetika *release* hidrogel tidak mengikuti satupun *current mathematical models* yang digunakan. Mekanisme matriks hidrogel PVA:GA tersebut dapat secara fenomenologis mengikuti fungsi tangga sebagai berikut: $C(t)_1 = 1E-06x$, $C(t)_2 = -3E-05x + 0.0208$, $C(t)_3 = 0.2257$, $C(t)_4 = 6E-06x - 0.0066$, dan $C(t)_5 = 0.3661$ yang secara fisis dapat dijelaskan sebagai berikut: tahap I yaitu 'Catastrophic Dissolution', tahap II yaitu difusi 1, tahap III yaitu deformasi hidrogel, dan tahap IV yaitu difusi 2.

Kata Kunci: hidrogel, *CRF*, *release behavior*, model release.

ABSTRACT

Synthesized of PVA-Glutaraldehyde based hydrogel has been known by one of it's property, slow-controlled-release. Thus, this hydrogel has much potential to be applied in modern agricultural. Although it has been so much research being done on the aspects of this hydrogel synthesis, the knowledge of kinetics and mechanism of this hydrogel's release behavior is much less advanced. The purpose of this study is therefore to evaluate the release behavior KCl from PVA:GA hydrogel in aqua demineralization.. The concentration of potassium in aqua dm was analyzed by AAS instrument. Samples was taken in the specified timeframe during 420 minutes of immersion. The data accumulated was analyzed with some of well-known mathematical release modeling (fitting to current models): zero order, first order, Higuchi, Hixson-Crowell, Hopfenberg, Weibull, and Korsmeyer-Peppas. Optimum synthesis composition is marked at volume ratio of PVA:GA = 1:1 with total volume of 5 mL, where the swelling ratio (SR%) is at 161% during 240 minutes of immersion. The result of release data has shown that the release kinetics of hydrogel did not fit any of current models used. The release behavior mechanism of this hydrogel phenomenologically follow the step function as follows: $C(t)_1 = 1E-06x$, $C(t)_2 = -3E-05x + 0.0208$, $C(t)_3 = 0.2257$, $C(t)_4 = 6E-06x - 0.0066$, and $C(t)_5 = 0.3661$ which physically can be explained as follows: first step: 'Catastrophic Dissolution', second step: 1st diffusion, third step: deformation of the hydrogel, and the fourth step is the 2nd diffusion..

Keywords: CRF, hydrogel, release behavior, release models.