

STUDI SIFAT FISIK, MEKANIK, DAN KINETIKA PELEPASAN EUGENOL PADA FILM KOMPLEKS POLIELEKTROLIT KITOSAN-ALGINAT SEBAGAI PENGEMAS AKTIF MAKANAN

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INTISARI

Studi mengenai pelepasan eugenol dan model kinetika pelepasannya pada film kompleks polielektrolit (KPE) kitosan-alginat telah dilakukan. Beberapa faktor yang mempengaruhi pelepasan seperti komposisi KPE kitosan-alginat dan konsentrasi eugenol juga telah dipelajari pada penelitian ini.

Pembuatan film kompleks polielektrolit kitosan-alginat yang teremban eugenol dilakukan pada pH \pm 4,0. Film KPE kitosan-alginat-eugenol selanjutnya dikarakterisasi menggunakan spektrofotometer FTIR. Selain itu, dilakukan pula analisis morfologi menggunakan SEM, analisis termal DTA/TGA, uji mekanik film, uji transparansi, uji penyerapan air, dan permeabilitas uap air. Studi pelepasan eugenol dilakukan secara *in vitro* dalam etanol 96% (v/v) selama 4 hari dan konsentrasi eugenol yang terlepas diukur menggunakan spektrofotometer UV-Vis.

Hasil karakterisasi dengan FTIR menunjukkan bahwa KPE kitosan-alginat terbentuk melalui interaksi ionik antara gugus amina ($-\text{NH}_3^+$) dari kitosan dan gugus karboksilat ($-\text{COO}^-$) dari alginat. Berdasarkan studi yang dilakukan, komposisi KPE kitosan-alginat dan konsentrasi eugenol akan mempengaruhi pelepasan eugenol dari film. Peningkatan kandungan alginat dan peningkatan konsentrasi eugenol dalam film akan meningkatkan jumlah eugenol yang terlepas. Persentase pelepasan tertinggi diperoleh sebesar 1,66%. Pelepasan eugenol dari film KPE kitosan-alginat mengikuti model kinetika Korsmeyer-Peppas. Hal ini menunjukkan bahwa pelepasan eugenol terjadi melalui proses difusi Fickian. Hasil uji aktivitas antioksidan menggunakan metode DPPH menunjukkan bahwa film memiliki aktivitas antioksidan yang baik yaitu dengan nilai RSA sebesar 56% dalam waktu 4 hari.

Kata kunci : KPE kitosan-alginat, eugenol, pelepasan, antioksidan, model kinetika

STUDY OF PHYSICO-MECHANICAL PROPERTIES AND RELEASE KINETICS OF EUGENOL ON CHITOSAN-ALGINATE POLYELECTROLYTE COMPLEX FILMS AS A FOOD ACTIVE PACKAGING

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ABSTRACT

Study of eugenol release and its release model kinetics from chitosan-alginate PEC films had been conducted. Some factors which affected the eugenol release were also studied, including the composition of chitosan-alginate PEC and concentration of eugenol.

Chitosan-alginate PEC films incorporated by eugenol were synthesized at $\text{pH} \pm 4.0$. Then, chitosan-alginate-eugenol PEC films were characterized using FTIR spectrophotometer. Investigation of films properties was also studied including morphology analysis using SEM, thermal analysis DTA/TGA, mechanical strength, transparency testing, water absorption, and water vapor permeability. Release study of eugenol was investigated through in vitro assay in ethanol 96% (v/v) for 4 days and the concentration of eugenol was measured using UV-Vis spectrophotometer.

Characterization of films using FTIR showed that the formation of polyelectrolyte complex (PEC) occurred through ionic interaction between amine groups ($-\text{NH}_3^+$) of chitosan and carboxylate groups ($-\text{COO}^-$) of alginate. Based on the result of this research, the composition of chitosan-alginate PEC and concentration of eugenol can affect the release of eugenol from PEC films. The higher concentration of alginate and eugenol could increase the concentration of eugenol which was released from the films. The highest value of eugenol's percentage release was 1.66%. The mechanism of eugenol release from chitosan-alginate PEC films followed Korsmeyer-Peppas model. It means that the release mechanism of eugenol occurred through Fickian diffusion process. Antioxidant activity assay of films by using DPPH method resulted in high RSA value of 56% in 4 days.

Keywords: PEC chitosan-alginate, eugenol, release, antioxidant, kinetics model