

## STUDI PELEPASAN $\alpha$ -TOKOFEROL DARI FILM KOMPLEKS POLIELEKTROLIT KITOSAN/PEKTIN DAN POTENSINYA SEBAGAI *ANTIOXIDANT PACKAGING*

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### INTISARI

Telah dilakukan penelitian mengenai pelepasan  $\alpha$ -tokoferol dari film KPE kitosan/pektin dan aktivitas antioksidannya. Beberapa faktor yang mempengaruhi pelepasan  $\alpha$ -tokoferol telah dipelajari, termasuk komposisi kitosan/pektin dalam KPE, konsentrasi Tween-80 dan konsentrasi  $\alpha$ -tokoferol yang terlemban dalam film.

Pembuatan kompleks polielektrolit (KPE) kitosan/pektin dilakukan pada pH 4 dan pengembunan  $\alpha$ -tokoferol yang bersifat hidrofobik ke dalam KPE kitosan/pektin dilakukan dengan penambahan surfaktan non-ionik Tween-80. Film yang dihasilkan dikarakterisasi menggunakan spektrofotometer FTIR. Studi pelepasan  $\alpha$ -tokoferol dilakukan secara *in vitro* selama 10 hari dalam *fatty food simulant* etanol 96% (v/v). Konsentrasi  $\alpha$ -tokoferol yang terlepas dari film ditentukan secara spektrofotometri UV-Vis.

Karakterisasi FTIR menunjukkan bahwa KPE kitosan/pektin terbentuk dari interaksi ionik antara gugus  $-\text{NH}_3^+$  kitosan dengan gugus  $-\text{COO}^-$  pektin. Hasil penelitian menunjukkan bahwa komposisi kitosan/pektin dalam KPE, konsentrasi Tween-80 dan konsentrasi  $\alpha$ -tokoferol yang terlemban dalam film berpengaruh terhadap pelepasan  $\alpha$ -tokoferol. Peningkatan kandungan pektin dan konsentrasi Tween-80 meningkatkan hidrofilisitas film yang juga meningkatkan laju pelepasan  $\alpha$ -tokoferol. Pelepasan  $\alpha$ -tokoferol tertinggi didapat ketika penggunaan film dengan pengembunan konsentrasi  $\alpha$ -tokoferol tertinggi yakni mencapai 98,49%. Pelepasan  $\alpha$ -tokoferol dari film KPE kitosan/pektin mengikuti model kinetika Korsmeyer-Peppas secara difusi. Uji aktivitas antioksidan menunjukkan bahwa film mempunyai aktivitas antioksidan yang baik dilihat dari nilai RSA terhadap radikal DPPH yang mencapai 90,60%. Profil pelepasan  $\alpha$ -tokoferol diawali oleh *burst effect* yang kemudian diikuti oleh pelepasan lebih lambat dan berkelanjutan hingga 10 hari. Oleh karena itu, Film KPE kitosan/pektin terlembani  $\alpha$ -tokoferol dapat dikembangkan sebagai *antioxidant packaging*.

Kata kunci: KPE kitosan/pektin,  $\alpha$ -tokoferol, pelepasan, antioksidan, pengemas

## **STUDY OF $\alpha$ -TOCOPHEROL RELEASE FROM CHITOSAN/PECTIN POLYELECTROLYTE COMPLEX FILM AND ITS POTENTIAL AS AN ANTIOXIDANT PACKAGING**

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### **ABSTRACT**

The research of release of  $\alpha$ -tocopherol from PEC chitosan/pectin films had been conducted. Some factors that affected the release of  $\alpha$ -tocopherol were studied, including composition of PEC chitosan/pectin, concentration of Tween-80 and concentration of  $\alpha$ -tocopherol.

PEC chitosan/pectin was synthesized at pH 4 and hydrophobic antioxidant  $\alpha$ -tocopherol was added into hydrophilic PEC chitosan/pectin by adding non-ionic surfactant Tween-80. The prepared films were characterized using FTIR spectrophotometer. In vitro release of  $\alpha$ -tocopherol was investigated for 10 days in ethanol 96% (v/v) as fatty food simulant. The concentrations of  $\alpha$ -tocopherol were determined spectrophotometrically.

The result of FTIR showed that ionic interaction occurred between ionized amino groups of chitosan ( $-\text{NH}_3^+$ ) and ionized carboxyl acid groups ( $-\text{COO}^-$ ) of pectin, leading to the formation of a polyelectrolyte complex (PEC). This research showed that composition of PEC chitosan/pectin, concentration of Tween-80 and concentration of  $\alpha$ -tocopherol affected the release of  $\alpha$ -tocopherol. Hydrophilicity of film increased with the rising content of pectin in PEC and concentration of Tween-80. This improvement in the hydrophilicity also leads to the increased of release rate of  $\alpha$ -tocopherol. The increase of  $\alpha$ -tocopherol concentration also promoted an increase of release rate of  $\alpha$ -tocopherol due to plasticizer effect in the films. Release mechanism of  $\alpha$ -tocopherol from PEC chitosan/pectin films followed Korsmeyer-Peppas model which indicated that the release mechanism was mainly controlled by Fickian diffusion process. The result of the performed DPPH assay showed that films exhibited high antioxidant activity. The release profile of all films exhibited an initial burst effect followed by sustain release over 10 days. Therefore, this films can be promising as an antioxidant packaging.

*Key words: PEC chitosan/pectin,  $\alpha$ -tocopherol, release, antioxidant, packaging*