INTISARI

Ekstraksi pektin dari limbah kulit jeruk telah digunakan untuk pembuatan *edible film*. *Edible film* dapat diaplikasikan sebagai media untuk *Drug Delivery System* (DDS) di dunia medis. Untuk mengontrol kualitas pemasukan obat dan pelepasan obat pada *edible film, plasticizer* gliserol umumnya ditambahkan pada pektin selama pembuatan film. Penelitian ini bertujuan mempelajari pengaruh gliserol terhadap sifat fisik, pemasukan obat dan pelepasan obat dari *edible film*. Pemodelan matematis juga diajukan untuk menggambarkan transfer massa pelepasan obat dari *edible film* melalui estimasi parameter difusi dan kesetimbangan. Obat yang digunakan dalam penelitian ini adalah asam salisilat. Metode penelitian ini terdiri dari tiga tahapan utama : (1) pembuatan *edible film* dengan variasi konsentrasi gliserol (0; 5; 10; dan 15% v gliserol / v larutan), (2) pemasukan obat, (3) pelepasan obat dari *film*. Karakteristik fisik *edible film* yang diukur seperti ketebalan, kuat tarik, persen pemanjangan, dan *swelling*. Performa pemasukan obat dan pelepasan obat dari *edible film* dianalisis menggunakan larutan *buffer*. Ketebalan film yang diperoleh antara 0,061-0,125 mm. Penambahan gliserol mempengaruhi karakteristik fisik dari *edible film.* Saat gliserol ditambahkan secara terus meningkat, nilai kuat tarik *film menjadi* menurun, nilai persen pemanjangan *film* meningkat, dan nilai *swelling* meningkat. Penambahan gliserol dapat meningkatkan nilai efisiensi pemasukan obat. Efisiensi pemasukan obat tertinggi adalah 78,86 % pada konsentrasi gliserol 15%. Kecepatan pelepasan obat meningkat dengan penambahan konsentrasi gliserol yang ditunjukkan melalui parameter-parameter yang sesuai dari pemodelan matematis. Nilai persentase obat dalam film yang dapat release ke cairan rata-rata sebesar 95,30%. Hasil simulasi memberikan nilai koefisien difusivitas (De) antara 3,8725-7,2095×10^{-13} m^2/detik, dan nilai koefisien distribusi antara 0,0154-0,0168. Pengaruh konsentrasi awal gliserol (C_{G0}) terhadap koefisien difusivitas cukup dapat diprediksikan dengan model matematis De = 8,2567×10^{-13}-(8,2567×10^{-13}- De_0)×$e^{-0,049\times C_{G0}}$ dengan ralat relatif 8,71%.

Kata kunci : pektin, *plasticizer* gliserol, *edible film*, *drug delivery system*

ABSTRACT

Pectin extracted from orange peel waste has been used as material for making edible film. Edible film is can be applied as a medium for Drug Delivery System (DDS) in medical sector. In order to control the quality, drug loading and release of the edible film, plasticizer such as glycerol is usually added to the pectin during the film formation. This research aimed to study the effect of glycerol to the physical properties, drug loading and release from the edible film. A mathematical model was also proposed to describe the mass transfer of drug release from the edible film in order to estimate the diffusion and equilibrium parameters. The sample of drug used in this study was salicylic acid. The research methods consisted of three main processes : (1) making of the edible film with the variation of glycerol solution concentrations (0; 5; 10; and 15% v glycerol / v solution), (2) drug loading, and (3) drug release. The physical properties of edible film sample were measured such as thickness, tensile strength, percentage of elongation, and swelling. The drug loading and drug release performance of the edible film were then analysis using buffer solution. The film thickness were measured in the range of 0.061-0.125 mm. The addition of glycerol were found affect the physical characteristics of the edible film. When glycerol was added increasingly to the edible film, the tensile strength decreased, percentage of elongation increased, and swelling increased. The addition of glycerol in the edible film could increase the drug loading efficiency. The highest value of the drug loading efficiency was 78.86% when glycerol concentration 15% was added. The drug release rate increased by adding glycerol, that also confirmed by the parameters fitted from the mathematical model. The average value of released drug from film into liquid is 95.30%. The simulation results gave the diffusivity coefficient (De) values ranged from 3.8725-7.2095×10^{-13} m^2/s, and the distribution coefficient values varied from 0.0154-0.0168. The effect of the initial concentration of glycerol (C_{G0}) to the diffusivity coefficient (De) can be adequately predicted by a mathematical model $De = 8.2567\times10^{-31} - (8.2567\times10^{-31} - De_0)\times e^{-0.049\times CG0}$ with the relative error of 8.71%.

Keywords : pectin, plasticizer glycerol, edible film, drug delivery system