EFFECT OF CINNAMALDEHYDE AS AN ANTIMICROBIAL IN CHITOSAN BASED MEMBRANE

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ABSTRACT

The objective of this research is to investigate the application of cinnamaldehyde as antimicrobial in chitosan based membranes. Chitosan solution of 1% was prepared by dissolving chitosan powder in 2 wt. % of acetic acid solution. Plasticizer solution was prepared by diluting glycerol with deionized water at 1 wt. % concentration. The volume of glycerol used in each sample was fixed. Cinnamaldehyde was added into the chitosan/plasticizer solution at different concentrations of 0.5 g, 1.0 g and 1.5 g. The mixtures were heated at 60°C for 30 minutes and were stirred continuously. Finally, the mixtures were cooled to room temperature and the films were casted and dried for further analysis. A sample consisted of only chitosan and plasticizer was set as the control. The prepared membranes were characterized for their functional groups and tensile strength using Fourier Transform Infrared spectroscopy (FTIR) and LLOYORD EZ 50 instrument, respectively. The membranes were also analyzed for the antimicrobial activity against Escherichia Coli bacteria. Results shown that different blending concentration of cinnamaldehyde and chitosan/plasticizer membranes (wt/wt %) exhibited different values and trend of graph on the tensile strength and percentage of elongation at break. Other than that, it was also observed that the chitosan-cinnamaldehyde membrane for each sample were blend homogenously according to their FTIR results. Lastly, results also showed that the highest volume of 1.5 g cinnamaldehyde used gave the highest and fastest zone of bacterial inhibition against E.coli using Kirby Bauer Method.
ABSTRAK

Kajian ini dijalankan untuk mengkaji kesan cinnamaldehyde sebagai antimikrobial di dalam membran chitosan dengan menggunakan kosenstrasi chitosan-cinnamaldehyde yang berbeza. Larutan chitosan berkosenstrasi sebanyak 1 % akan disediakan dengan melarutkan serbuk tepung chitosan di dalam larutan asetik asid yang berkosenstrasi sebanyak 2 %. Larutan pemplastik disediakan dengan melarutkan gliserol dalam air suling pada konsentrasi 1%. Jumlah gliserol yang digunakan dalam setiap sampel adalah tetap. Cinnamaldehyde akan dicampurkan ke dalam larutan chitosan/pemplastik pada kosenstrasi yang berbeza iaitu 0.5 mL, 1.0 mL dan 1.5 mL. Satu sampel yang mengandungi chitosan dan pemplastik dijadikan sebagai sampel kawalan. Larutan membran tersebut akan dipanaskan pada suhu 60˚C selama 30 minit dan dikacau secara berterusan. Akhirnya, larutan itu diletakkan pada suhu bilik sehingga kering dan diasingkan untuk dijadikan membran. Membran itu kemudian dianalisa untuk mengkaji kumpulan befungsi dan kekuatan tegangan serta peratus pemanjangan pada takat putus menggunakan alat Fourier Transform Infrared spectroscopy (FTIR) dan LLYORD EZ 50. Selain itu, membran itu juga digunakan bagi mengkaji tindak balas terhadap bakteria Escherichia Coli. Keputusan ujikaji membuktikan membran yang terdiri daripada jumlah cinnamaldehyde yang berbeza menunjukkan nilai kekuatan tegangan dan peratus pemanjangan pada takat putus juga berbeza. Selain itu, kajian juga menunjukkan membran chitosan serta cinnamaldehyde bagi setiap sampel bercampur secara homogeny dan sekata berdasarkan keputusan bacaan FTIR. Akhir sekali, keputusan juga membuktikan sampel yang dicampur dengan 1.5 g cinnamaldehyde mempamerkan sampel yang paling cepat bertindak terhadap tumbesaran bakteria E.Coli menggunakan kaedah Kirby Bauer.


