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EFFECT OF PROCESSING TEMPERATURE AND POLYMER CONCENTRATION ON PLASTICITY OF HOT AIR-DRIED MANNURONATE-RICH ALGINATE FILMS

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ABSTRACT

The present study investigated the plasticity of hot air-dried mannuronate-rich alginate films prepared from 2 and 4% (w/w) alginate solutions, which contained the same amount of polymer, through hot-air drying at 40 to 80□□for use as transdermal drug delivery system. These films were subjected to thermomechanical, differential scanning calorimetry, fourier-transform infra-red, x-ray diffractometry, dimension, morphology, moisture content, viscosity and polymer molecular weight analysis. It was found that the films plasticity increased when a dilute alginate solution was employed in film preparation. This was due to decrease in polymer-polymer interaction at high strength domains of matrix involving C-H, O-H, C-O and/or C=O moiety of alginate, attributing to plasticization effect of water. The plasticity of film decreased with an increase in drying temperature from 40 to 60□C following heat-induced polymer-polymer interaction. A further increase in drying temperature to 80□C nonetheless greatly promoted film plasticity through air bubble formation and reduced alginate molecular weight in film.