

Title An approach for the enhancement of the mechanical properties and film coating efficiency of shellac by the formation of composite films based on shellac and gelatin

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Abstract

The purpose of this study was to enhance the mechanical properties and film coating efficiency of shellac by the formation of composite films with different concentrations of gelatin. The composite films were prepared by the casting method and their mechanical and physicochemical properties were investigated. The results demonstrated that the puncture strength and percentage elongation of the composite film increased from 3.61 to 15.58 MPa and from 3.80% to 32.47% as the gelatin concentration increased to 50% w/w, respectively, indicating the enhancement of the strength and flexibility of the shellac film. The efficiency of the composite film over two model substrates, i.e., hydrophilic and hydrophobic substrates, respectively, was also studied. The work of adhesion and spreading coefficient of the composite film increased from 66.42 to 83.53 mN/m and from -8.14 to -3.07 mN/m for the hydrophilic substrate, indicating the improvement of the coating efficiency whereas the hydrophobic substrate showed the opposite trend with the increase in gelatin concentration. Therefore, the formation of the composite film not only improved the mechanical properties of shellac but also enhanced the efficiency of film coating by the modification of different concentrations of hydrocolloid polymer to suit with the type of coating substrate. Hence the knowledge of composite film could make beneficial contributions to the various applications in film coating for the food and pharmaceutical industries.