

The characteristics and structure properties of starches after graft Copolymerized modification

Abstract

Native starches consist of potato, cassava and corn starch were treated with acrylic acid and potassium persulfate, K₂S₂O₈, and chemically modified by graft copolymerization method. The grafted starch were modified by different percentages of K₂S₂O₈ initiator that were 0.2%, 0.4%, 0.6%, 0.8% and 1.0% in order to enhance the hydrophilicity of newly modified starch. Graft yield and moisture absorption test were conducted to observe the physical behaviour of the grafted starches. Graft yield with 0.8% K₂S₂O₈ has higher grafting percentages which suggests that starch polymer attain certain limits of chemical exposure through modification. For moisture absorption test, the observed percentage of moisture absorption inclined with the concentration of K₂S₂O₈ percentage. This suggests that since K₂S₂O₈ itself is a water soluble initiator, the hydrophilic characteristic develops as the concentration of K₂S₂O₈ got higher which made it easier to absorb surrounding moisture. FTIR analysis was used to determine the chemical compound of grafted starch and the results shows that all three types of modified starches have hydroxyl compound. The breakage of hydrogen bond between starch molecules that were caused by acids during graft copolymerization which stretches the O-H bond and the correspondence to water as well as OH absorption frequencies, thus enhancing the hydrophilic behavior. The surface morphological characteristics were determined using SEM by the changes in starch granules from spheroid shape into more crystalline shape with rough surface. The higher concentration of K₂S₂O₈ presented in grafted starch indicates that the rougher surface of starch granules suggests the chemical has corrosive characteristics that erode the starch granules in contact.