Carboxymethylation of Cassava Starch in Different Solvents and Solvent-Water Mixtures: Optimization of Reaction Conditions

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ABSTRACT

The influence of reaction medium on carboxymethylation process was investigated by treating cassava starch with sodium monochloroacetate in different solvents and solvent-water mixtures under alkaline conditions. The amount of carboxyl groups introduced into the starch moiety was determined titrimetrically and used to calculate the Degree of Substitution (DS) and Reaction Efficiency (RE). The results showed that carboxymethylation is significantly affected by the nature of reaction medium at p<0.05. Carboxymethylation in different solvent-water mixtures showed that aqueous 80% n-propanol offered the best medium for carboxymethylation. Optimization of reaction conditions in aqueous 80% n-propanol showed that the best condition for carboxymethylation was at starch-liquor ratio of 1:3, NaOH/reagent molar ratio of 4.0 and reagent-starch molar ratio of 0.35. An increase in temperature was required to effect the reaction at shorter time. At 55°C the highest values of DS and RE achieved in 0.5 h would require three hours to achieve the same values of DS and RE at 45°C.