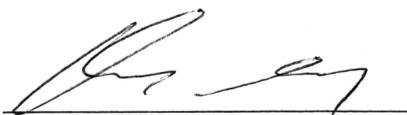


Vanida Wongkulab 2008: Preparation and Physico-Chemical Properties of Quaternary Ammonium Starch Ether From Cassava Starch by Wet and Dry Processes. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Associate Professor Klanarong Sriroth, Dr.Ing. 98 pages.

Quaternary ammonium starch ether is a chemically modified starch carrying cationic group. This cationic starch is prepared by the etherification of starch with 3-chloro-2-hydroxypropyltrimethyl ammonium chloride (CHPTAC) under alkaline condition. In this study, the effects of modification conditions and the physico-chemical properties of quaternary ammonium starch ether prepared from cassava starch by wet and dry processes were investigated. The modification conditions under study included the molar ratio of CHPTAC to anhydroglucose unit ($n(\text{CHPTAC}) : n(\text{AGU}) = 0.02-0.12$), the molar ratio of sodium hydroxide to CHPTAC ($n(\text{NaOH}) : n(\text{CHPTAC}) = 0.5-3.0$) and the reaction time (1-22 hours). Results revealed that the optimal amounts of sodium hydroxide during cationization of cassava starch by wet process were similar to those of dry process which were found to be at $n(\text{NaOH}) : n(\text{CHPTAC})$ of 2.0, 1.5, 1.5 and 1.5 for the reactions containing $n(\text{CHPTAC}) : n(\text{AGU})$ of 0.02, 0.04, 0.08 and 0.12 respectively. However, the rate of reaction in the dry process was much higher than that of the wet process. While cationization under wet conditions required reaction time of 22 hours, the optimal reaction time for dry process was only 4 hours. Quaternary ammonium starch ether with degree of substitution (DS) of 0.01, 0.03, 0.05 and 0.07 were prepared under optimal conditions by wet and dry processes and their physico-chemical properties were determined. The properties of quaternary ammonium starch ether were found to depend on the derivatization methods and degree of substitution. The granular structure of quaternary ammonium starch ether prepared by wet process was similar to that of native starch, but quaternary ammonium starch ether prepared by dry process showed some granular damage. Cold water solubility, swelling power and solubility, peak viscosity and paste clarity of quaternary ammonium starch ether were higher than those of native starch and increased with increasing DS. On the other hand, the gelatinization temperature, enthalpy of gelatinization and degree of retrogradation of quaternary ammonium starch ether were lower than those of native starch and decreased with increasing DS. Quaternary ammonium starch ether prepared from different methods showed variation in their properties.

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