Sirithorn Lertphanich 2006: Preparation Conditions and Physico-chemical Properties of Cassava Starch Oxidized by Sodium Hypochlorite. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Associate Professor Klanarong Sriroth, D.Ing. 88 pages.

Oxidized starch is a chemically modified starch widely used in various applications, especially in a paper industry. Oxidized starch is produced by reacting starch with an oxidizing agent. Sodium hypochlorite is the most commonly used oxidizing agent in a commercial process. Conditions used during the modification process have been known to be an important factor in determining the properties of modified starch. In this study, the effects of preparation conditions on the physico-chemical and structural properties of cassava starch oxidized by sodium hypochlorite were investigated. The preparation conditions under study included reaction pH (pH 7-11), hypochlorite concentrations (calculated as 1, 3 and 5 % active chlorine based on starch), reaction temperature (30-50 °C) and time (30-300 min). When compared to native cassava starch, hypochlorite-treated starches contained higher amounts of carbonyl and carboxyl groups, exhibited improved whiteness and lower paste viscosity. Molecular size of oxidized starch tended to decrease as indicated by High Performance Size Exclusion Chromatography. Scanning Electron Microscopy revealed that hypochlorite-treated starch contained cracks and fissures on granule surface. The extent of changes observed in starch properties was found to depend on modification conditions. Experimental results demonstrated that reaction pH was a major factor in determining starch properties. The formation of carbonyl content was found to be highest at pH 7 and became lower with increasing pH. The optimal pH for the formation of carboxyl content was between 8-9. Starches modified under pH 9-11 exhibited higher whiteness than those prepared at pH 7 and 8. Modification process conducted at pH 7 resulted in the starch with lowest paste viscosity since the early stage of the reaction while a process conducted at pH 9 yielded starch with highest viscosity (compared among oxidized starches). The changes in starch properties were also found to depend on an oxidant concentration. Results demonstrated that the amount of carbonyl and carboxyl groups and cracks on granule surface increased with an increase of hypochlorite concentration while the paste viscosity and molecular size tended to decrease. The reaction temperature had no effect on carbonyl and carboxyl contents and the morphology of starch granule; but it caused a reduction in starch viscosity.

Sirithorn Lertphanich
Student's signature

Thesis Advisor's signature

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