Chookiat Kijkhunasatian 2007: Effects of Sodium Chloride, Sucrose, pH and Cooking Process on Paste Properties of Cassava and Modified Cassava Starch. Master of Science (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor: Associate Professor Klanarong Sriroth, Dr. Ing. 118 pages.
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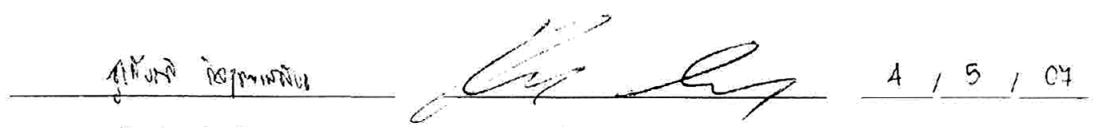
The effects of food ingredients, i.e. sugar (5, 10 and 20% sucrose) and salt (1, 3 and 5% sodium chloride) as well as food processing, i.e. pH (acid and alkali) and cooking temperature (75, 95 and 121°C) on paste viscosity of native and three modified (acetylated, crosslinked and acetylated-crosslinked) cassava starches were evaluated to predict starch behaviors in real food system. When sucrose was added to a total weight-constant system (i.e. water was replaced by sucrose at an equivalent weight – System I), significant increases in pasting temperatures and peak viscosities of all starches were observed with increased sucrose concentrations whereas pure sucrose solutions exhibited negligible viscosities as determined by Rapid Visco Analyser. These could be presumably explained by an increase in the ratios of starch to water as sucrose contents increased (0.10, 0.11, 0.11 and 0.13 for 0, 5, 10 and 20% sucrose) and the role of antiplasticizer of sucrose. Further investigation was accomplished in the system where sucrose was additionally added to a constant starch-water ratio mixture, i.e. 1:9.85 (System II). Peak viscosities of all starches did not significantly increase. The pasting temperatures still increased which strongly suggested the antiplasticizing effect of sucrose as sucrose competitively interacted with water, resulting in a reduction of free water in starch-water system. Similar results were observed when salt was added to the starch slurry. Under system I, salt caused an increase in peak viscosity and pasting temperatures of all starches whereas no peak viscosity increase was observed when evaluated under system II. Most starches when cooked in acid or alkaline conditions exhibited lower peak viscosities. Only the crosslinked starch, when cooked in and alkali environment, yielded a higher peak viscosity. Cooking temperature also influenced paste viscosity as determined by a Brookfield viscometer. At higher cooking temperatures, the granules of native and acetylated starches were more fragile, therefore provided pastes with lower viscosities. In contrast, crosslinked and acetylated-crosslinked starches had higher viscosities as they could withstand more severe cooking conditions due to crosslinking bridges between starch molecules.



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