Pawinee Silaket 2014: Thermal Properties of Esterified Cassava Starches and Their Esterified Cassava Maltodextrins in Various Moisture Systems. Doctor of Philosophy (Biotechnology), Major Field: Biotechnology, Department of Biotechnology. Thesis Advisor:
Associate Professor Klanarong Sriroth, Dr .Ing. 193 pages.

Esterified cassava starches were prepared by reaction with various types of acid anhydride (1-4% and 7% dsb of acetic anhydride, 1-4% dsb succinic anhydride and octenyl succinic anhydride), yielding acetylated (AC), succinylated (SC) and octenyl succinylated (OSA) starches with different degrees of substitution (DS = 0.010-0.069, 0.009-0.027 and 0.006-0.024, respectively). The pasting properties were tested using a Rapid Visco Analyzer. SC and OSA starch had significantly higher peak viscosity (PV), hot paste viscosity (HPV), cool paste viscosity (CPV) and setback (SB), relative to the native starch. The gelatinization temperature of the esterified starches decreased significantly ($P< 0.05$) with increasing degree of substitution (DS). Their thermal properties at limited (13%), intermediate (50%) and excess (70%) water content were evaluated in order to elucidate the effect of substituent groups. Esterified cassava starches had glass transition temperature (*T*g) values of 93.5, 91.7 - 78.5, 75.7 - 93.7 and 96.3 - 72.5°C for native, AC, SC and OSA, respectively. The gelatinization and retrogradation of AC, SC and OSA starches (DS ≈ 0.020) were evaluated in excess (70%w/w) and intermediate (50%w/w) water systems. In both systems, esterification at low DS did not cause dramatic change in onset temperatures. Starch retrogradation at 4°C, 21 days in excess water system was the lowest for OSA starch, followed by SC and AC. As a result of large substituting groups, chain rearrangement in OSA starch was suppressed. A similar trend was also observed in intermediate water system, but the degree of retrogradation was higher. The α- amylase enzyme (SPEZYME® LT 300) was used to produce the esterified cassava maltodextrins (acetylated cassava maltodextrins, succinylated cassava maltodextrins and octenyl succinylated cassava maltodextrin) by the hydrolysis process. The thermal properties of esterified cassava starches and esterified cassava maltodextrins were determined using a differential scanning calorimeter (DSC). The glass transition onset inflection point temperature (T_g) of esterified cassava maltodextrins at the same DS (≈ 0.020) presented that the T_g of almost esterified cassava maltodextrins with high DE had decreased significantly ($P< 0.05$) with increasing dextrose equivalent (DE). However, the T_g of octenyl succinylated maltodextrin with low DE (0.6) decreased, but when DE increased (4.16) , the *Tg* increased and was not significantly different from OSA starch ($P > 0.05$).

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