Mallika Tapanwong 2012: Optimization of Wax Esters Production from Palm Fatty Acid Distillate and Oleyl Alcohol over Amberlyst 15 as Catalyst by Response Surface Methodology. Master of Science (Chemistry), Major Field: Chemistry, Department of Chemistry. Thesis Advisor: Associate Professor Vittaya Punsuvon, Ph.D. 175 pages.

Wax esters were derived from long chain fatty acid and long chain alcohol with chain length of 12 carbons or more. These compounds had many potential applications in cosmetics, pharmaceuticals and food industries. The present work focuses on the synthesis of wax esters using palm fatty acid distillate and oleyl alcohol catalyzed by Amberlyst 15 catalyst. Response surface methodology (RSM) based on a five-level-four-factor-variable central composite design (CCD) was used to evaluate the interactive effects of synthesis, amount of Amberlyst 15 catalyst (10–40 %wt/wt), reaction time (0–4 hours), molar ratio of palm fatty acid distillate to oleyl alcohol (1–4 moles) and reaction temperature (40–80 ^{O}C) on the percentage conversion of palm fatty acid distillate and percentage yield of wax esters. The optimum conditions derived via RSM were 30 %wt/wt of Amberlyst 15, 3.5:1 of oleyl alcohol-to-PFAD molar ratio, 2.5 hours of reaction time and 70 ^{O}C of reaction temperature. The actual experimental conversion and yield were 93.89% and 83.93% under optimum condition which corresponded with the maximum predicted values of 93.98% and 83.02%, respectively. The experiment further studied on the efficiency of reusable Amberlyst 15 catalyst and wax esters synthesis without catalyst. The results showed the efficiency reduction of reusable catalyst about 15% on percentage conversion from the first cycle of experiment. The results on wax esters production without Amberlyst 15 catalyst showed that PFAD could be catalyzed itself to produce wax esters at high temperature. Wax esters obtained from this synthesis were further analyzed for physical properties and confirmed their functional groups by FT-IR.

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