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Prediction of phase equilibria in ternary diagram for system consist of Hot Compressed Water (HCW) with crude palm oil (CPO) and others minor component using thermodynamic model

Abstract

Knowledge on phase equilibria for the separation process are important. It helps to improve the extraction efficiency through parameter optimization. Nowadays, hot compressed water extraction (HCWE) is getting the interest for the crude palm oil (CPO) extraction. Therefore, the phase equilibria of system consist of Hot compressed water (HCW) and CPO component are crucial. In this study, prediction of phase equilibria in ternary diagram for system consist of HCW with CPO and others minor component was conducted using thermodynamic model. The prediction was conducted using modified UNIFAC. CPO and other minor components namely palmitic acid which represent FFA, β-carotene, α-tocopherol, α-tocotrienol and α-tocotrieno was totally insoluble in HCW. The solubility of HCW in CPO was effect by the temperature and concentration of palmitic acid, β-carotene and α-tocopherol. However, the effect of these minor component concentration was inrrelevant since the concentration of these component was lower in the CPO for less than 1%. The solubility of HCW in CPO need to be monitored to avoid the hydrolysis which can deteriorate the CPO and degrade its quality.