Solubility of red palm oil in supercritical carbon dioxide: measurement and modelling

ABSTRACT

The solubility of red palm oil (RPO) in supercritical carbon dioxide (scCO2) was determined using a dynamic method at 8.5–25 MPa and, 313.15–333.15 K and at a fixed scCO2 flow rate of 2.9 g·min− 1 using a full factorial design. The solubility was determined under low pressures and temperatures as a preliminary study for RPO particle formation using scCO2. The solubility of RPO was 0.5–11.3 mg·(g CO2)− 1 and was significantly affected by the pressure and temperature. RPO solubility increased with pressure and decreased with temperature. The Adachi–Lu model showed the best-fit for RPO solubility data with an average relative deviation of 14% with a high coefficient of determination, R2 of 0.9667, whereas the Peng–Robinson equation of state thermodynamic model recorded deviations of 17%–30%.