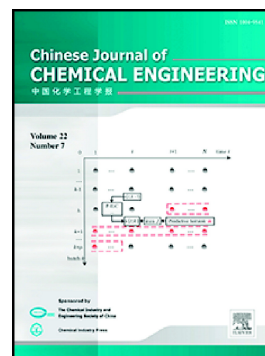


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Separation Science and Engineering

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

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### Abstract

The solubility of red palm oil (RPO) in supercritical carbon dioxide (scCO<sub>2</sub>) was determined using a dynamic method at 8.5 – 25 MPa and, 313.15 – 333.15 K and at a fixed scCO<sub>2</sub> flow rate of 2.9 g·min<sup>-1</sup> using a full factorial design. The solubility was determined under low pressures and temperatures as a preliminary study for RPO particle formation using scCO<sub>2</sub>. The solubility of RPO was 0.5 – 11.3 mg·g<sup>-1</sup> CO<sub>2</sub> 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, R<sup>2</sup> of 0.9667, whereas the Peng-Robinson equation of state thermodynamic model recorded deviations of 17% – 30 %.

### 1. Introduction

Red palm oil (RPO) is often regarded as identical to crude palm oil due to the intense red colour the RPO. Nonetheless, RPO is produced through a process of pretreatment, deacidification and deodorization using molecular distillation from crude palm oil [1]. Unlike palm oil, the absence of bleaching process when producing RPO retains its high

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