

## Using Phase Equilibrium Theory to Calculate Solubility of $\gamma$ -Oryzanol in Supercritical CO<sub>2</sub>

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**Abstract :** Even its content is rich in antioxidants  $\gamma$ -oryzanol, rice bran is not used properly as functional food. This research aims to (1) extract  $\gamma$ -oryzanol; (2) determine the solubility of  $\gamma$ -oryzanol in supercritical CO<sub>2</sub> based on phase equilibrium theory; and (3) study the effect of process variables on solubility. Extraction experiments were carried out for rice bran (5 g) at various extraction pressures, temperatures and reaction times. The flowrate of supercritical fluid through the extraction vessel was 25 g/min. The extracts were collected and analysed with high-pressure liquid chromatography (HPLC). The conclusion based on the experiments are as: (1) The highest experimental solubility was 0.303 mcg/mL RBO at T= 60°C, P= 90 atm, t= 30 min; (2) Solubility of  $\gamma$ -oryzanol was influenced by pressure and temperature. As the pressure and temperature increase, the solubility increases; (3) The solubility data of supercritical extraction can be successfully determined using phase equilibrium theory. Meanwhile, tocopherol was found and slightly investigated in this work.

**Keywords :** rice bran, solubility, supercritical CO<sub>2</sub>,  $\gamma$ -oryzanol

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