SOLUBILITY CORRELATION OF SABAH GREEN ROBUSTA COFFEE (*COFFEA CANEPHORA*) BEAN EXTRACT IN SUPERCRITICAL CARBON DIOXIDE EXTRACTION

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Abstract

This research focuses on the solubility correlation of Sabah green Robusta coffee (Coffeacanephora)bean extract using supercritical carbon dioxide (SC-CO_2) extraction. Sabah, the largest coffee-growing area in Malaysia, provides a rich source of Robusta beans for this study. Solubility of coffee bean oil was examined across a range of pressures (10 to 30 MPa) and temperatures (40 °C to 80 °C). The highest solubility, 2.681 mg/g CO_2, was observed at 30 MPa and 40 °C while, the lowest solubility was obtained at 20 MPa and 80 °C about 0.440 mg/g CO_2. Thus, as the temperature increased to 80 °C, the solubility decreased significantly, highlighting the inverse relationship between temperature and solubility in this system. Higher pressure, particularly at 30 MPa, led to increased solubility due to enhanced density and solvating power of SC-CO_2. The experimental solubility data showed a great correlation Chrastil's equation, achieving a percentage error about 3.37% compared with del Valle-Aguilera's equation about 14.57%. These results suggest the Chrastil model's suitability for accurately predicting the solubility of green coffee bean oil in SC-CO_2. The study underscores the potential of SC-CO_2 extraction for use in the food industry as an environmentally friendly, solvent-free method to obtain high-quality extracts from coffee beans. This extraction technique can be extended to other bioactive compounds in food processing, offering a sustainable alternative for industrial applications.

Keywords: *Supercritical carbon dioxide extraction, Green Robusta Coffee Bean, Solubility, Correlation.*