

Title: Solubility assessment of castor (*Ricinus communis* L) oil in supercritical CO₂ at different temperatures and pressures under dynamic conditions

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Abstract: A simple dynamic technique was used to obtain the solubility of castor oil in supercritical carbon dioxide. The solubility was measured at temperatures ranging from 313 to 335K and pressures from 20 to 36MPa. Under extraction conditions, the measured solubilities were in the range from 1.29×10^{-3} to 4.88×10^{-3} (g of oil)/(g of CO₂). Measurements confirmed that temperature and pressure have direct effects on solubility-enhancement factors. Five semi-empirical models were tested for their ability to correlate experimental data: the Chrastil, Del Valle Aguilera (VA), Bartle, Kumar and Johnston (KJ), and Mendez-Santiago and Teja (MST) models. Over the temperature and pressure ranges studied, solubilities from these models had the following average absolute relative deviations from experimental data: Chrastil, VA, Bartle, KJ and MST models with an average absolute relative deviation percent (AARD%) of 0.05%, 0.30%, 0.38%, 5.98% and 28.4%, respectively. Thus, the Chrastil, VA and Bartle models correlated the castor oil solubility data with the lowest AARD%.