

Measurement and correlation of solubility of anthraquinone derivatives in supercritical carbon dioxide

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学位論文概要
Dissertation Summary

学位請求論文 (Dissertation)

題名 (The title) Measurement and correlation of solubility of anthraquinone derivatives in supercritical carbon dioxide

(邦題) (Title in Japanese) 超臨界二酸化炭素中でのアントラキノ
誘導体の溶解度測定および相関

専攻 (Division) : Material Sciences

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This thesis reported the measurement and correlation of solubility anthraquinone derivatives in supercritical carbon dioxide, they include 6 binary system namely, 1,4-diaminoanthraquinone + CO₂, 1,4-bis(ethylamino) anthraquinone + CO₂, 1-Amino-4- hydroxyanthraquinone + CO₂, 1-hydroxy-4-nitroanthraquinone + CO₂, 1-aminoanthraquinone + CO₂, 1,8-dihydroxy-4,5-dinitroanthraquinone + CO₂. Furthermore, we divided into 3 system. we can be summarized as follows: for the first system, Solubility data of 1,4diaminoanthraquinone and 1,4-bis (ethylamino)anthraquinone in supercritical carbon dioxide have been measured at the temperature of (323.15, 353.15, 383.15)K pressure range from (12.5 to 25.0) M Pa by a flow type apparatus. The solubility of anthraquinone derivatives was obtained over the mole fraction ranges of (1.3 to 26.1)•10⁻⁷ for 1,4-diaminoanthraquinone,(1.1 to 148.5)•10⁻⁷ for 1,4-bis(ethylamino), 1-amino-4-hydroxyanthraquinone (4.0×10⁻⁷ to 226.1× 10⁻⁷), 1-hydroxy-4-nitroanthraquinone (5.64× 10⁻⁷ to 88.2×10⁻⁷), 1-aminoanthraquinone (Smoke Orange G) (5.5× 10⁻⁷ to 351.25×10⁻⁷), and 1,8-dihydroxy-4,5-dinitroanthraquinone (1.68× 10⁻⁷ to 11.15× 10⁻⁷). The experimental results have been correlated with the empirical equations of Mendez-Santiago-Teja and and Kumar-Johnston in terms of density sc- CO₂, analyzed thermodynamically by regular solution model with the Flory- Huggens theory and the Peng-Robinson equation of state modified by Stryjek and Vera with the conventional mixing rules. Good agreement between the experimental and calculated solubilities was obtained.