

热力学

丁香油主要成分在超临界CO₂中的溶解度测定与关联

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收稿日期 2006-8-9 修回日期 2006-9-26 网络版发布日期 2007-5-29 接受日期

摘要 采用动态法分别测定了丁香油中主要成分丁香酚、乙酰丁香酚和β-石竹烯在超临界CO₂中的溶解度。实验结果表明: 三种成分在超临界CO₂中的溶解度随着压力的增加而增大, 随温度的增加而变小。在压力10-30MPa和温度313.15-333.15K范围内, 丁香酚在超临界CO₂中的溶解度(摩尔分数)为0.0002-0.0580, 乙酰丁香酚在超临界CO₂中的溶解度(摩尔分数)为0.00018-0.07030, β-石竹烯在超临界CO₂中的溶解度(摩尔分数)为0.00034-0.07096。采用Chrastil方程及其改进方程(Adachi、del Valle)分别对三种化合物在超临界CO₂中的溶解度数据进行了关联, 对丁香酚关联的AARD值分别为4.92%、4.47%、5.19%, 对乙酰丁香酚关联的AARD值分别为3.69%、2.91%、3.24%, 对丁香酚关联的AARD值分别为4.77%、4.41%、4.21%。

关键词 [溶解度](#) [超临界CO₂](#) [丁香油](#) [丁香酚](#) [乙酰丁香酚](#) [β-石竹烯](#) [关联](#)

分类号

Determination and correlation of solubilities of clove oil components in supercritical carbon dioxide

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Abstract

The solubilities of eugenol, eugenol acetate and β-caryophyllene, which are the main components in clove oil, in supercritical CO₂ were separately determined at the temperature range from 40°C to 60°C and pressure from 10 MPa to 30 MPa. The results showed that the solubilities of these components increased with increasing pressure or decreasing temperature. The solubility of β-caryophyllene was higher than those of eugenol and eugenol acetate at the same temperature and pressure. The solubilities of eugenol in SC-CO₂ were between 0.0002 and 0.0580 (mole fraction). The solubilities of β-caryophyllene in SC-CO₂ were between 0.00034 and 0.07096 (mole fraction). The solubilities of eugenol acetate in SC-CO₂ were between 0.00018 and 0.07030 (mole fraction). The solubility data of the main components of clove oil in SC-CO₂ were correlated with the Chrastil equation and improved Chrastil equations presented by Adachi and del Valle. The values of average-absolute-relative-deviation(AARD) for eugenol solubility correlation were 4.92%, 4.47%, 5.19% respectively. The values of AARD for eugenol acetate solubility correlation were 3.69%, 2.91%, 3.24% respectively. The values of AARD for β-caryophyllene solubility correlation were 4.77%, 4.41%, 4.21% respectively.

Key words [solubility](#) [supercritical carbon dioxide](#) [clove oil](#) [eugenol](#) [eugenol acetate](#) [β-caryophyllene](#) [correlation](#)

DOI:

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