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A new empirical model to correlate solute solubility in supercritical carbon dioxide in presence of co-solvent

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Highlights

- A new density dependent empirical model with five parameters is proposed.
- The new correlation have been used for calculation of solute solubility in SCCO₂ in presence of co-solvent.
- The result comparisons show good accuarcy of the new model.

Abstract

In this work, correlation of solute solubility in supercritical fluid in presence of co-solvent has been carried out using a new density-dependent empirical equation. The new model has five parameters for each system. The parameters of the new correlation have been obtained for various ternary systems including 1668 experimental solubility data. The overall percent of absolute average deviations (%AARD) are 1.57 and 2.35 using different density calculation methods. The comparisons of the new equation and the published models show its good capability in calculating solute solubility in supercritical fluid in presence of co-solvent.

Keywords: Supercritical CO₂, Co-solvent, Empirical equation, Multicomponent solubility.

1. Introduction

Supercritical fluids (SCFs) are used in several industrial processes such as chemical, pharmaceutical and food processes because of their good advantages, such as density similar to liquids and transport properties similar to gases [1], good permeability, and low surface tension [2, 3].

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