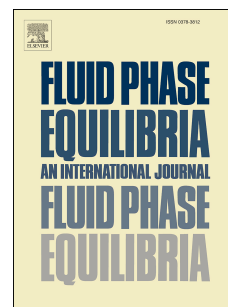


Accepted Manuscript

Solubility of dialkylalkyl phosphonates in supercritical carbon dioxide: Experimental and modeling approach

K.C. Pitchaiah, C.V.S. Brahmananda Rao, N. Sivaraman, M. Joseph, Giridhar Madras, Iliia Brondz



PII: S0378-3812(16)30607-0

DOI: [10.1016/j.fluid.2016.12.011](https://doi.org/10.1016/j.fluid.2016.12.011)

Reference: FLUID 11355

To appear in: *Fluid Phase Equilibria*

Received Date: 28 October 2016

Revised Date: 28 November 2016

Accepted Date: 11 December 2016

Please cite this article as: K.C. Pitchaiah, C.V.S.B. Rao, N. Sivaraman, M. Joseph, G. Madras, I. Brondz, Solubility of dialkylalkyl phosphonates in supercritical carbon dioxide: Experimental and modeling approach, *Fluid Phase Equilibria* (2017), doi: 10.1016/j.fluid.2016.12.011.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Solubility of dialkylalkyl phosphonates in supercritical carbon dioxide: experimental and modeling approach

K.C. Pitchaiah¹, C.V.S. Brahmananda Rao¹, N. Sivaraman^{1,*}, M. Joseph¹, Giridhar Madras² and Ilia Brondz³

¹Chemistry Group, Indira Gandhi Centre for Atomic Research, HBNI, Kalpakkam-603 102, India

² Indian Institute of Science, Bangalore-560012, India

³Norwegian Drug Control and Drug Discovery Institute AS, Ski, Norway

*Corresponding author: email: sivaram@igcar.gov.in

Abstract

Dialkylalkyl phosphonates have found renewed interest in the selective extraction of actinides from different matrices. In this context, two dialkylalkyl phosphonates, dibutylbutyl phosphonate (DBBP) and diamylamyl phosphonate (DAAP) were synthesised and their solubilities in supercritical carbon dioxide (SCCO₂) medium were determined in the pressure range of 10 to 25 MPa at 313 to 333 K. Solubility studies were carried out to examine their utility as ligands during supercritical fluid extraction of actinides. Solubilities of dialkylalkyl phosphonates ranged from 0.06 to 0.12 mole fraction. Experimental solubilities were correlated using Mendez-Santiago, Chrastil, solution theory with Wilson activity coefficient model and association model based on van Laar activity coefficient model. Comparison among these models revealed that the association model with van Laar activity coefficient model provides better solubility predictions. SCCO₂ containing DAAP was employed for the (i) selective extraction of uranium in the presence of simulated fission products and (ii) extraction of uranyl nitrate from acidic medium.

Keywords: Solubility, Phosphonates, Supercritical Carbon Dioxide, Semi-empirical Models, Selective Extraction.

Download English Version:

<https://daneshyari.com/en/article/4768147>

Download Persian Version:

<https://daneshyari.com/article/4768147>

[Daneshyari.com](https://daneshyari.com)