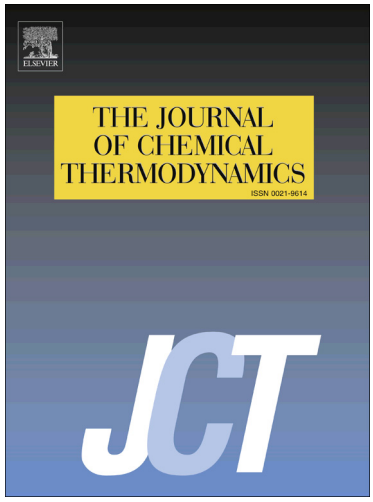

Solubilities and diffusivities of R227ea, R236fa and R245fa in 1-Hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide

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PII: S0021-9614(18)30276-3
DOI: https://doi.org/10.1016/j.jct.2018.04.004
Reference: YJCHT 5381

To appear in: *J. Chem. Thermodynamics*

Received Date: 17 November 2017
Revised Date: 18 March 2018
Accepted Date: 5 April 2018

Please cite this article as: X. Liu, P. Pan, F. Yang, M. He, Solubilities and diffusivities of R227ea, R236fa and R245fa in 1-Hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide, *J. Chem. Thermodynamics* (2018), doi: https://doi.org/10.1016/j.jct.2018.04.004

Solubilities and diffusivities of R227ea, R236fa and R245fa in 1-Hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide

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Abstract

The solubilities and diffusion coefficients of 1,1,1,3,3-pentafluoropropane (R245fa), 1,1,1,2,3,3,3-heptafluoropropane (R227ea) and 1,1,1,3,3,3-hexafluoropropane (R236fa) in 1-hexyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide ([HMIM][Tf_2N]) were determined experimentally along five isotherms (303.15, 313.15, 323.15, 333.15 and 343.15 K) with pressures from 0.01 to 0.50 MPa. The solubility measurements were carried out using the isochoric saturation method. A semi-infinite volume method was used to calculate diffusion coefficient via the time-dependent pressure-decay data. NRTL model was used to correlate the gas solubility data of R245fa, R227ea and R236fa in [HMIM][Tf_2N] with the average absolute relative deviations less than 1.0 %, while Wilke-Chang equation was used to correlate the diffusion coefficient data with the average absolute relative deviations less than 9.7 %.

Keywords: solubility; diffusivity; ionic liquid; refrigeration; hydrofluorocarbon

1. Introduction

Absorption refrigeration appears to be one of the most promising cooling technologies because its driving force can be low-grade energies such as the geothermal energy [1]. Since the thermodynamic efficiency and reliability of absorption refrigeration system are strongly dependent on the working pair which contains one refrigerant and one absorbent. Traditional working pairs, lithium bromide-water and ammonia-water have some shortcomings such as crystallization,