

## Accepted Manuscript

Kinetic and Thermodynamic Behavior of CF<sub>4</sub> Clathrate Hydrates

Saeedeh Babaee, Hamed Hashemi, Amir H. Mohammadi, Paramespri Naidoo,  
Deresh Ramjugernath

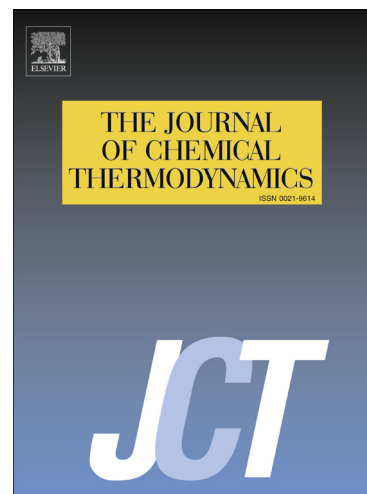
PII: S0021-9614(14)00293-6  
DOI: <http://dx.doi.org/10.1016/j.jct.2014.09.008>  
Reference: YJCHT 4039

To appear in: *J. Chem. Thermodynamics*

Received Date: 3 May 2014  
Revised Date: 11 September 2014  
Accepted Date: 16 September 2014

Please cite this article as: S. Babaee, H. Hashemi, A.H. Mohammadi, P. Naidoo, D. Ramjugernath, Kinetic and Thermodynamic Behavior of CF<sub>4</sub> Clathrate Hydrates, *J. Chem. Thermodynamics* (2014), doi: <http://dx.doi.org/10.1016/j.jct.2014.09.008>

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.



# Kinetic and Thermodynamic Behavior of CF<sub>4</sub> Clathrate Hydrates

Saeedeh Babaei<sup>a,b</sup>, Hamed Hashemi<sup>a,b</sup>, Amir H. Mohammadi<sup>a,c,\*</sup>, Paramespri Naidoo<sup>a</sup>,  
Deresh Ramjugernath<sup>a,†</sup>

<sup>a</sup> Thermodynamics Research Unit, School of Engineering, University of KwaZulu-Natal, Howard College  
Campus, King George V Avenue, Durban 4041, South Africa.

<sup>b</sup> Department of Chemical Engineering, Buinzahra Branch, Islamic Azad University, Buinzahra, Iran

<sup>c</sup> Institut de Recherche en Génie Chimique et Pétrolier (IRGCP), Paris Cedex, France.

**Abstract** - This study presents experimental kinetic and thermodynamic data for CF<sub>4</sub> clathrate hydrates. Experimental measurements were undertaken in a high pressure equilibrium cell with a 40 cm<sup>3</sup> inner volume. The measurements of experimental hydrate dissociation conditions were performed in the temperature range of (273.8 to 278.3) K and pressures ranging from (4.55 to 11.57) MPa. A thermodynamic model based on van der Waals and Platteeuw (vdW-P) solid solution theory was used for prediction and comparison of hydrate dissociation conditions and the Langmuir constant parameters for CF<sub>4</sub> based on Parrish and Prausnitz equation are reported. For the kinetics, the effect of initial pressure and temperature on the induction time, CF<sub>4</sub> hydrate formation rate, the apparent rate constant of reaction, storage capacity, and water to hydrate conversion during the hydrate formation were studied. Kinetic experiments were performed at initial temperatures of (275.3, 276.1 and 276.6) K and initial pressures of (7.08, 7.92, 9.11, 11.47 and 11.83) MPa. Results show that increasing the initial pressure at constant temperature decreases the induction time, while CF<sub>4</sub> hydrate formation rate, the apparent rate constant of reaction, storage capacity, and water to hydrate conversion increase. The same trends are observed with a decrease in the initial temperature at constant pressure.

---

\*E-mail: [a.h.m@irgcp.fr](mailto:a.h.m@irgcp.fr) & [amir\\_h\\_mohammadi@yahoo.com](mailto:amir_h_mohammadi@yahoo.com)

†E-mail: [ramjuger@ukzn.ac.za](mailto:ramjuger@ukzn.ac.za)

Download English Version:

<https://daneshyari.com/en/article/6660604>

Download Persian Version:

<https://daneshyari.com/article/6660604>

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