

## Accepted Manuscript

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PII: S0009-2509(18)30154-4  
DOI: <https://doi.org/10.1016/j.ces.2018.03.024>  
Reference: CES 14098

To appear in: *Chemical Engineering Science*

Received Date: 5 September 2017  
Revised Date: 7 March 2018  
Accepted Date: 12 March 2018

Please cite this article as: Z. Feng, S.R. Panuganti, W.G. Chapman, Predicting Solubility and Swelling Ratio of Blowing Agents in Rubbery Polymers Using PC-SAFT Equation of State, *Chemical Engineering Science* (2018), doi: <https://doi.org/10.1016/j.ces.2018.03.024>

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# Predicting Solubility and Swelling Ratio of Blowing Agents in Rubbery Polymers Using PC-SAFT Equation of State

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## Abstract

The PC-SAFT Equation of State is applied here to study polymer - blowing agent phase equilibrium in various systems of industrial interest. Where required, PC-SAFT parameters of blowing agents and polymers are obtained by regression to experimental data. Gas solubility and swelling ratio of polymer material predicted by PC-SAFT is seen to agree well with experiments. The PC-SAFT model is then extended to predict gas solubility and swelling ratio in a broad range of operating conditions, well beyond those reported by corresponding experiments. PC-SAFT has also been robust in predicting gas solubility in random copolymer or gas blend foaming systems showing additional degrees of freedom in foam formulation design, and requiring only inputs from the individual homopolymer or single blowing agent systems. From this work, PC-SAFT offers a reliable method to extrapolate existing measured data and provide guidelines for screening and design of new products and processes.

Keywords: PC-SAFT, solubility, swelling, polymer, blowing agent.

## 1. Introduction

Polymer foaming technology developed in the 20<sup>th</sup> century has found more and more applications in our everyday lives due to the unique properties of polymer foams in comparison to non-foamed materials.

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