## Accepted Manuscript

### Research paper

A comparison between Peng-Robinson and Soave-Redlich-Kwong Cubic Equations of State from modification perspective

Mehdi Ghanbari, Mahdi Ahmadi, Asghar Lashanizadegan

PII:	S0011-2275(16)30353-8
DOI:	http://dx.doi.org/10.1016/j.cryogenics.2017.04.001
Reference:	JCRY 2678
To appear in:	Cryogenics
Received Date:	30 November 2016
Revised Date:	2 April 2017
Accepted Date:	4 April 2017

ELSEVIER	1594 0011-2275
CRYOGEN I or traper area requered a galet agreer conductivity Cryopheryonics Cryophysics	

Please cite this article as: Ghanbari, M., Ahmadi, M., Lashanizadegan, A., A comparison between Peng-Robinson and Soave-Redlich-Kwong Cubic Equations of State from modification perspective, *Cryogenics* (2017), doi: http://dx.doi.org/10.1016/j.cryogenics.2017.04.001

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.

# ACCEPTED MANUSCRIPT

## A comparison between Peng-Robinson and Soave-Redlich-Kwong Cubic Equations of State from modification perspective

Mehdi Ghanbari<sup>\*</sup>, Mahdi Ahmadi, Asghar Lashanizadegan<sup>†</sup>

Chemical engineering department, School of engineering, Yasouj University, Yasouj 75918-74831, Iran

#### Abstract

The Cubic Equations of State (CEOSs) are the most important tools in PVT calculations due to their simplicity in use and their extrapolative abilities to condition well outside their correlation ranges. Peng-Robinson (PR) and Soave-Redlich-Kwong (SRK) are most successful in the CEOSs which have repeatedly been modified in order to improve their accuracy in wider ranges of temperature and pressure. Unfortunately, most of modifications carried out on these EOSs have no adequate justification for selecting either of these as the basic starting point for the modifications. In this paper, PR and SRK EOSs were critically compared with each other using some new features of their subcritical and supercritical results. For this purpose, the CEOSs were assessed using comprehensive tests of the PVT calculations in the vapor-liquid equilibrium (for pure hydrocarbons over a wide range of acentric factor values: Methane, Ethane Propane, Butane, Heptane and Nonane) and Joule-Thomson Inversion Curves' (JTICs) predictions (for compounds which have reliable JTICs data: Methane, Ethane, Ethylene, Nitrogen, Oxygen, Argon and Carbon dioxide) in subcritical and supercritical regions, respectively. The results indicated that the PR EOS by using any of realistic  $\alpha$ -function forms will never be able to accurately predict the JTICs in full span. On the other hand, the subcritical results revealed that the great success of the PR CEOS in predicting liquid phase density is only because of its function in shifting the results of the SRK CEOS to the lower values with the same curve trend. In addition, the Patel and Teja's (PT) EOS, has been reevaluated and the results showed that most of the defects of PR EOS still remain. This article suggests that in order to develop CEOSs, the original SRK EOS is a better candidate than original and alternative forms of PR EOS.

Key word: Equation of state; Modification; Soave-Redlich-Kwong; Peng and Robinson; Subcritical; Supercritical.

<sup>\*,</sup> E-mail address: <u>m1\_g1@yahoo.com (</u>Mehdi Ghanbari)

<sup>\*</sup> Corresponding Author, E-mail address: Lashani@mail.yu.ac.ir (A. Lashanizadegan), Tel.:+98917 111 4566

Download English Version:

# https://daneshyari.com/en/article/5444120

Download Persian Version:

https://daneshyari.com/article/5444120

Daneshyari.com