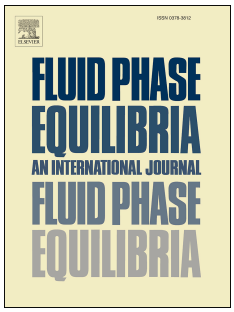
Accepted Manuscript



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PII: S0378-3812(16)30368-5

DOI: 10.1016/j.fluid.2016.07.029

Reference: FLUID 11201

To appear in: *Fluid Phase Equilibria*

Received Date: 28 May 2016

Revised Date: 27 July 2016

Accepted Date: 28 July 2016

Please cite this article as: R. Farzi, F. Esmaeilzadeh, Prediction of surface tension of pure hydrocarbons using Esmaeilzadeh-Roshanfekr equation of state and group contribution method, *Fluid Phase Equilibria* (2016), doi: 10.1016/j.fluid.2016.07.029.

Prediction of surface tension of pure hydrocarbons using Esmaeilzadeh-Roshanfekr equation of state and group contribution method

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Abstract

In this paper, a new model with the help of Esmaeilzadeh-Roshanfekr equation of state (ER EoS) and group contribution method was proposed to obtain the surface tension of various hydrocarbons in different temperatures and ambient pressure. To this end, 7 groups (-CH_3, >CH_2, >CH-, >C<, =CH-, =CH_2, and =C<) were defined that appear in the structure of hydrocarbons. 350 experimental data points of 40 hydrocarbons were also employed that 281 data points of 32 hydrocarbons were used to obtain the values of group increments and the remaining data points (69 experimental data points of 8 hydrocarbons) were used to validate the group contribution method used in the proposed model. Additionally, the accuracy of the proposed model was compared with the other equations of state such as Soave-Redlich-Kwong (SRK EoS), Peng-Robinson (PR EoS), and Van der Waals (VW EoS) that the results of the proposed model showed fewer error and better accuracy. The total average absolute relative deviations (TAARDs) of the proposed model and the other models with the help of SRK EoS, PR EoS, and VW EoS are found to be 6.54%, 12.15%, 12.57%, and 15.30%, respectively.

Keywords: Surface Tension, Hydrocarbons, Esmaeilzadeh-Roshanfekr Equation of State, Group Contribution Method, Differential Evolution

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