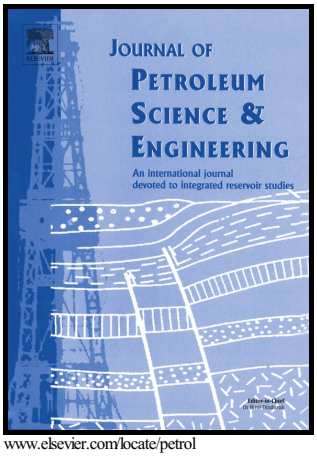

www.elsevier.com/locate/petrol

A new correlative model for viscosity estimation of pure components, bitumens, size-asymmetric mixtures and reservoir fluids

Pouya Hosseinifar, Saeid Jamshidi

PII: S0920-4105(16)30436-3
DOI: http://dx.doi.org/10.1016/j.petrol.2016.09.034
Reference: PETROL3641

To appear in: *Journal of Petroleum Science and Engineering*

Received date: 20 July 2016
Revised date: 13 September 2016
Accepted date: 20 September 2016

Cite this article as: Pouya Hosseinifar and Saeid Jamshidi, A new correlative model for viscosity estimation of pure components, bitumens, size-asymmetric mixtures and reservoir fluids, *Journal of Petroleum Science and Engineering* http://dx.doi.org/10.1016/j.petrol.2016.09.034

A new correlative model for viscosity estimation of pure components, bitumens, size-asymmetric mixtures and reservoir fluids

Pouya Hosseinifar[1], Saeid Jamshidi[2*]

[1]MAPSA Technology Center, Tehran, Iran

[2]Department of Chemical and Petroleum Engineering, Sharif University of Technology, Tehran, Iran

p.hosseinifar@mapsaeng.com
jamshidi@sharif.edu

[*]Corresponding author: Tel.: +98 21 66166412, fax: +98 21 66022853.

Abstract

Estimation of petroleum fractions properties is one of the major problems in the reservoir fluids analysis, due to the fact that they cannot exactly be diagnosed and their constituents are not available clearly. In this study, a simple model has been developed to estimate the viscosity of pure hydrocarbon substances, bitumens, size-asymmetric mixtures and reservoir fluids (containing unknown hydrocarbon mixtures or petroleum fractions). The proposed model has been extended based on the two conventional and physical properties which can be measured for both pure components and unknown mixtures, without requiring to have their components and compositions. This model uses the pressure (P), temperature (T), molecular weight (M_w) and mass density (ρ) as its input parameters. Experimental viscosity data of 10 pure components are selected from the Aromatics and Alkanes families to compare against the results obtained from the model, in order to evaluate the performance of the suggested model. In addition, 20 oil samples are also gathered to evaluate the model for reservoir fluids. The experimental viscosity data of Athabasca bitumen and three mixtures of bitumen-solvent with different compositions are also employed to examine the applicability of the proposed model in the viscosity estimation of highly viscous fluids and asymmetric mixtures from the ambient temperature up to 473 K at various pressures. Nearly 75% of the experimental data were used in optimization process and the rest of them were used to validate the proposed model. The results obtained from the two well-known and conventional viscosity models (friction theory and LBC model) are then compared to the proposed model. The calculated average absolute errors for pure substances and reservoir fluids indicate that the proposed model presents acceptable outcomes, in spite of its simplicity and it is more accurate in comparison with the other mentioned methods.

Keywords

Viscosity; Estimation; Reservoir fluids; Bitumen; LBC model

Nomenclature

$a_1, a_2, a_3, b_1, b_2, b_3, \alpha, \beta$ and γ	adjustable variables used in Eq. (7)
K_c	critical viscosity constant