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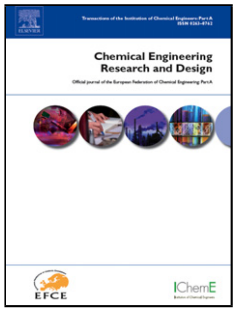

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Authors: Javad Sayyad Amin, Somayye Nikkhah, Sohrab Zendehboudi

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ACCEPTED MANUSCRIPT

A New Experimental and Modeling Strategy to Determine Asphaltene Precipitation in Crude Oil

Javad Sayyad Amin[1*], Somayye Nikkhah[1], Sohrab Zendehboudi[2*]

[1] Department of Chemical Engineering, University of Guilan, Rasht, Guilan, Iran

[2] Faculty of Engineering and Applied Science, Memorial University, St. John's, NL, Canada

[*] Corresponding authors' e-mail addresses: sayyadamin@gmail.com (J. Sayyad Amin) and szendehboudi@mun.ca; sohrab.zendehboudi@gmail.com (S. Zendehboudi)

Highlights

- This research introduces a new deterministic strategy in asphaltene precipitation
- Experimental study covers wide ranges of conditions in asphaltene precipitation
- RSM is used to develop a model through conducting parametric sensitivity analysis
- ANOVA technique examines efficiency of the proposed model
- RSM is a strong tool for calculation of asphaltene precipitation

Abstract

Asphaltene precipitation phenomenon which exhibits considerable influence on enhanced oil recovery (EOR) processes is taken into account as an important matter in the petroleum and chemical engineering processes/operational units. Available mathematical methods to investigate important aspects of this production problem (e.g., precipitation conditions and determination of amount of precipitated asphaltene) seem difficult to be implemented at a variety of process conditions and oil properties. Thus, it is important to evaluate the influences of different controlling variables on the asphaltene precipitation for practical purposes through introduction of proper mathematical/empirical correlations. In this research work, an experimental approach and response surface methodology (RSM) are employed to study the impacts of main factors, including pressure, molecular weight (Mw) of n-alkanes (n-pentane, n-hexane, and n-heptane) and dilution ratio on the asphaltene precipitation in a dead oil sample through a systematic parametric

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