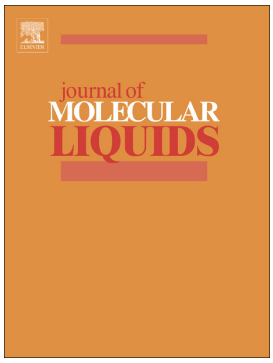

Characterizing the CO2-brine interfacial tension (IFT) using robust modeling approaches: A comparative study

Arash Kamari, Maysam Pournik, Alireza Rostami, Amin Amirlatifi, Amir H. Mohammadi

PII: S0167-7322(17)30421-X
DOI: doi: 10.1016/j.molliq.2017.09.010
Reference: MOLLIQ 7846

To appear in: *Journal of Molecular Liquids*

Received date: 30 January 2017
Revised date: 1 September 2017
Accepted date: 3 September 2017

Please cite this article as: Arash Kamari, Maysam Pournik, Alireza Rostami, Amin Amirlatifi, Amir H. Mohammadi , Characterizing the CO2-brine interfacial tension (IFT) using robust modeling approaches: A comparative study, *Journal of Molecular Liquids* (2017), doi: 10.1016/j.molliq.2017.09.010

Characterizing the CO_2-Brine Interfacial Tension (IFT) Using Robust Modeling Approaches: A Comparative Study

Arash Kamari,[a] Maysam Pournik,[b] Alireza Rostami,[c] Amin Amirlatifi,[d] Amir H. Mohammadi,[*e,f]**

[a] *Department of Geology, Kansas State University, 108 Thompson Hall, Manhattan, KS 66506, USA*

[b] *The Mewbourne School of Petroleum and Geological Engineering, University of Oklahoma, USA*

[c] *Department of Petroleum Engineering, Petroleum University of Technology (PUT), Ahwaz, Iran*

[d] *Dave C. Swalm School of Chemical Engineering, Mississippi State University, USA*

[e] *Discipline of Chemical Engineering, School of Engineering, University of KwaZulu-Natal, Howard College Campus, King George V Avenue, Durban 4041, South Africa*

[f] *Institut de Recherche en Génie Chimique et Pétrolier (IRGCP), Paris Cedex, France*

Abstract – Interfacial phenomenon between CO_2 and water phases affects the distribution and behavior of fluids in porous media, and also plays a major role in determining the usefulness of enhanced oil recovery methods particularly CO_2 flooding. Therefore, in this study, the interfacial tension (IFT) between CO_2 and brine is predicted as a function of the temperature, pressure, bivalent cation molality, monovalent cation molality as well as methane and nitrogen mole fractions using three robust modelling strategies called gene expression programming (GEP), decision tree (DT), and least squares support vector machine (LSSVM). Furthermore, the outcomes obtained by the methods mentioned above have been assessed by comparing with the reported estimates of artificial neural network (ANN) in the literature. Amongst the all models proposed in current study, it is demonstrated that the developed regression DT tool and the available ANN in literature are the most precise models which could be applied properly as the reliable methods for the characterization and determination of IFT between CO_2 and brine, and also for geological CO_2 storage.

Keywords - Interfacial tension (IFT); CO_2; Brine; Prediction; Modeling.

[*]Corresponding authors Email: *amir_h_mohammadi@yahoo.com*

[**]Corresponding authors Email: alireza.rostami.put2014@gmail.com