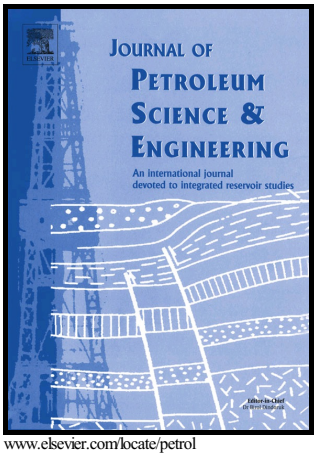

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PII: S0920-4105(16)30103-6
DOI: http://dx.doi.org/10.1016/j.petrol.2016.03.019
Reference: PETROL3396

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

Received date: 27 October 2015
Revised date: 16 March 2016
Accepted date: 27 March 2016

Cite this article as: Sajjad Esmaeili, Marziyeh Rahbar, Hassan Pahlavanzadeh and Shahab Ayatollahi, Investigation of streaming potential coupling coefficients and zeta potential at low and high salinity conditions; Experimental and Modeling approaches, *Journal of Petroleum Science and Engineering* http://dx.doi.org/10.1016/j.petrol.2016.03.019

Investigation of streaming potential coupling coefficients and zeta potential at low and high salinity conditions; Experimental and Modeling approaches

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Abstract

Streaming potential measurement is one of the electrokinetic techniques used to determine the average zeta potential of porous rock which can provide reliable information on reservoir flow behaviour and wettability state of the rock surface. Streaming potential measurement using electrodes has recently been introduced in the oil reservoirs applications and there are still significant uncertainties during the measurements and interpretation of streaming potential results. The primary purpose of this work is to establish a setup to measure the streaming potential of porous media with low scattering and evaluate voltage measurements based on the paired stabilization and pressure ramping methods. Streaming potential coupling coefficients of 36 samples of sand particle are measured in salinity from 0.0005 M to 0.025 M NaCl solutions. Then, the measured streaming potential coupling coefficients and zeta potential are compared with the published experimental results. Besides the good agreement that was achieved with the published experimental results, much lower scattering in the data points was accomplished for different saline injecting water. An accurate empirical expression is proposed for the measured coupling coefficients which predicts streaming potential coupling coefficients and zeta potential in the salinity range from 0.0001 M to 5.5 M.

Keyword: Streaming potential, Zeta potential, Coupling coefficient, Salinity.