Geophysical Research Abstracts
Vol. 15, EGU2013-13313, 2013
EGU General Assembly 2013

Magnetic theoretical and experimental study of clays for petroleum reservoir clay typing

Aleksandr Ivakhnenko, Maria Makarova, and Meruert Telman

Department of Geology & Physics of the Earth, Kazakh-British Technical University, 59 Tolebi Str. Almaty, Kazakhstan (a.ivakhnenko@kbtu.kz; energy.petroleum@gmail.com/Fax: +7 727 2720487)

This study describes theoretical and experimental magnetic analysis of different clay types for petroleum reservoir characterisation by using low and high field magnetic susceptibility. Most clays for example, saponite, clay loam and bentonite are paramagnetic, whereas some clays (kaolinite) and matrix minerals such as quartz and calcite are diamagnetic. Model magnetic susceptibility and magnetic hysteresis plots for various concentrations of different clays in quartz matrix were initially calculated. Experimental magnetic measurements were undertaken for comparison on a series of synthetic reservoir samples comprising various concentrations of dispersed clays in a quartz matrix. The experimental magnetic measurements showed substantial agreement with the model magnetic values, and with estimates of the magnetic susceptibility based on low and high field magnetic susceptibility for derived mineral contents. Importantly different magnetic parameters, including IRM (isothermal remnant magnetisation) were determined for the different clay types and their mixtures with the sandstone rock matrix, together with given permeability variations in the samples. Results demonstrate that these magnetic measurements potentially provide a sensitive, rapid, quantitative technique which can be used for petrophysical analysis of clay-rich rocks and clay typing.