

Adsorption isotherm for wettability evaluation

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Abstract. Nowadays, digital rock technologies are successfully developed and applied in the oil industry. So, relative phase permeability and EOR scenarios can be easily simulated using microCT 3D-model of pores and wettability data. But, the most important input parameter that is wettability can be measured directly only for high permeable rock by any of Amott-based method. Data on wettability of tight rock (permeability below 1mD) is mostly unavailable. We propose using of adsorption-based methods for wettability evaluation.

Now we continue the study on rock characterization by calorimetry (presented in SCA 2018-053) where differential scanning calorimetry and gas sorption technique were used to characterize fluid/rock interaction. At the present time, we have finished jointing both setups and conducting test experiments on thermodynamic characterization of interaction between pure liquid (water, hexane) and solid (porous glasses, calcite, carbon).

In the paper we will discuss implementation of static volumetric adsorption technique and adsorption calorimetry for evaluation of wettability through free surface energy which is related to the wettability state of the surface of a formation. The both techniques and their combination were applied for characterization of artificial porous media with predefined surface properties. Experimental setup as well as results of test experiments will be presented and discussed in the paper.