

An Experimental Study of the Influence of Flow Rate on Formation Damage at Different pH

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Abstract : This experiment focuses on the reduction of permeability (formation damage) as a result of fines migration by changing pH and flow rate on core plugs selected from sandstone reservoir of Pannonian basin (Upper Miocene, East Hungary). The main objective of coreflooding experiments was to investigate the influence of both high and low pH fluids and the flow rate on stability of clay minerals. The selected core samples were examined by X-ray powder diffraction (XRD) for bulk mineralogical and clay mineral composition. The shape, position, distribution and type of clay minerals within the core samples were diagnosed by scanning electron microscopy and energy dispersive spectroscopy (SEM- EDS). The basic petrophysical properties such as porosity and initial permeability were determined prior to experiments. The special core analysis (influence of pH and flow rate) on permeability reduction was examined through a series of laboratory coreflooding experiments, testing for acidic (3) and alkaline (11) solutions at different flow rates (50, 100 and 200 ml/h). Permeability in continuously reduced for pH 11 to more than 50 % of initial permeability. However, at pH 3 after a slow decrease, a significant increase is observed, to more than 40 % of initial permeability. The variation is also influenced by flow rate.

Keywords : flow rate, pH, permeability, fine migration, formation damage, XRD, SEM- EDS

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