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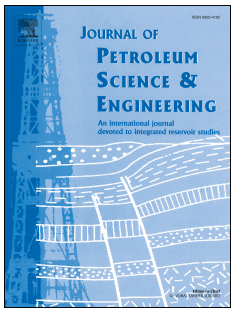

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Systematic pore-scale study of low salinity recovery from Berea sandstone analysed by micro-CT

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ABSTRACT

The low salinity effect in clay-rich outcrop sandstones is probed by micro-CT imaging and analysis. A set of eight Berea sandstone mini-plugs underwent primary drainage and aging in crude oil to a mixed-wet state, followed by spontaneous imbibition of high and low salinity brines and imaging of this sequence of prepared starting and endpoint states. Tomogram registration and analysis were used to determine the salinity-induced changes in oil volume, oil/rock and oil/brine interfacial areas, and oil/brine interfacial mean curvature. Pore-scale statistics were extracted to explore any local correlation between the low salinity effect and pore geometry/topology. The qualitative observations and quantitative analyses demonstrated that the small oil recovery by the low salinity effect corresponded to a slight shift towards water-wet.

Keywords: Low salinity water flooding, Spontaneous imbibition, Micro CT, Image Analysis, wettability

1. Introduction

Laboratory and field data shows that oil recovery from clay-containing sandstones can increase by reduction of injected brine salinity. However the amount of incremental oil recovery by low salinity is very variable and difficult to predict, due to insufficient understanding of this process (Morrow and Buckley 2011, Masalmeh et al. 2014).