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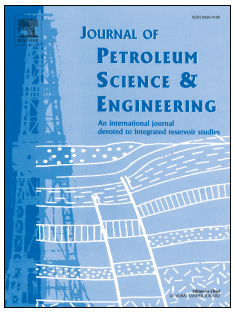

The effect of organic acids on wettability of sandstone and carbonate rocks

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The effect of organic acids on wettability of sandstone and carbonate rocks.

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Abstract

This paper examines the role of crude oil's organic acid surface active compounds (SAC) in determining the reservoir wettability over a range of salinities and temperatures. To isolate the effects of individual SACs, this project used model oil mixtures of pure decane and single SACs to represent the oleic phase. Due to the large number of experiments in this study, we used wettability measurement method by the modified flotation technique (MFT) to produce fast, reliable, and quantitative results. The results showed that oil wetting by decane increased with temperature for carbonate rocks. Sandstones oil wetting showed little temperature dependency. The presence of long-chained acids in decane increased oil wetting in sandstone and carbonate rocks as salinity was lowered, while the short-chained acid increased water wetting under the same conditions. The effect of organic acids on wettability was slightly enhanced with increasing temperature for all rock types.

1. Introduction

To meet the global rising energy demand, the oil and gas industry is challenged to maximize oil recovery from the existing hydrocarbon reservoirs. The current global average field recovery from waterflooding is around 35%, leaving between 60 to 70% of oil in place (Shell, 2016). This represents a substantial opportunity for enhanced oil recovery (EOR) processes. The concept of engineering and optimizing the injected water chemistry, primarily by lowering salinity has proved to be a promising EOR technique known by several names including LoSal™ (Lager et al., 2008), designer waterflooding (Ligthelm et al., 2009), advanced ion management