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Wettability Restoration of Limestone Cores Using Core Material From the Aqueous Zone

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Abstract

In the struggle to mimic the wetting state of a limestone reservoir, strongly water wet preserved cores from the aqueous zone have been used. By exposing the cores to the reservoir crude oil and formation water, the authors tried to mimic core properties from the oil leg. Wettability and oil recovery of restored cores were compared, confirming that both wettability and oil recovery depended on the fluids used in the cleaning process. When the preserved cores from the water zone was cleaned mildly and restored with formation brine and crude oil, they behaved in strongly water-wet way (reference core), while restored oil contaminated cores cleaned by organic solvents acted less water-wet. The water wetness was improved when the oil-contaminated cores were cleaned with hot seawater or hot seawater containing cationic surfactant. The oil recovery by spontaneous imbibition for the reference cores was significantly higher than the restored cores previously exposed to crude oil. In the case of forced

displacement, the oil recovery from the water-wet reference core was lower than the same restored core.

Keywords:

core cleaning | limestone | special core analysis | wettability restoration

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