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Article

## Effect of Temperature, Wettability and Relative Permeability on Oil Recovery from Oil-wet Chalk

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**Abstract:** It is customary, for convenience, to use relative permeability data produced at room temperature. This paper shows that this practice underestimates oil recovery rates and ultimate recovery from chalk rocks for high temperature reservoirs. Above a certain temperature (80°C in this work) a reduction of oil recovery was observed. The reduction in oil recovery is reflected by the shift of relative permeability data towards more oil-wet at high temperature (tested here 130°C). However, both IFT and contact angle measurements indicate an increase in water wetness as temperature increases, which contradict the results obtained by relative permeability experiments. This phenomenon may be explained based on the total interaction potential, which basically consists of van der Waals attractive and short-range Born repulsive and double layer electrostatic forces. The fluid/rock interactions is shown to be dominated by the repulsive forces above 80°C, hence increase fine detachment enhancing oil trapping. In other words the indicated oil wetness by relative permeability is misleading.

**Keywords:** Temperature; Relative Permeability; Oil Recovery; Wettability (Contact angle); Interfacial tension (IFT); Fluid/rock interaction

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