

A LABORATORY STUDY ON THE CORRELATION OF INTERFACIAL CHARGE
WITH VARIOUS INTERFACIAL PROPERTIES IN RELATION TO OIL
RECOVERY EFFICIENCY DURING WATER FLOODING

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ABSTRACT

The objective of the proposed research was to correlate the interfacial charge with other interfacial properties of crude oil/brine interface. In the present study, the crude oil (Seeligson Oil Field, Texas) was dispersed ultrasonically in aqueous solutions of different NaCl concentrations. The crude oil droplets exhibited the maximum electrophoretic mobility at 3.5% NaCl concentration. At the same NaCl concentration, the drop-volume of the crude oil in brine was minimum which suggested that the interfacial tension at the crude oil/brine interface was also minimum. Moreover, the coalescence rate was slowest at 3.5% NaCl concentration. We propose that these changes observed at 3.5% NaCl concentration are due to the surface charge density at the crude oil/brine interface. Furthermore, we observed the maximum oil recovery efficiency (i.e. the minimum residual oil) in sand-packs when the crude oil was displaced by 3.5% NaCl solution. A possible explanation for the maximum oil recovery efficiency is proposed in terms of the interfacial charge at the crude oil/brine interface and that at the sand/brine interface.