

# **Studying the Effect of Rock Mineralogy and Oil Composition on Contact Angle and Interfacial Tension of Two Phases at Different Conditions**

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## **Abstract**

Wettability has a significant impact on flow of oil during Enhanced Oil Recovery (EOR) and a profound effect on fluid distribution in oil fields. Mechanisms that influence the interaction between injected water and the components of crude oil in the presence of carbonate rock sample were investigated. This paper presents an experimental work on wettability alteration on crude oil/brine/carbonate systems. The objective of this paper is to study the interaction between oil and sea water under different pressure and temperature conditions. Different oil samples with different content of asphaltene were used in different combinations with different formation matrix to measure the contact angles. Also, the Interfacial tension of the two fluids were measured. The ultimate goal of that is to come up with an empirical correlation that can be used to predict the contact angle and the interfacial tension by knowing the type of rock and the type of oil samples of various asphaltene content. In this experiment, oil samples with different composition (Saturate, Aromatic, Resin and Asphaltene) were studied. Heavy oil Analysis was implemented on five different type of oil samples to determine the percentage of asphaltenes in each type of the oil samples. The five oil samples were used to study their interaction with three different rock samples. The rock samples consist of different mineralogy: purely calcite, pure dolomite and the third consists of different percentage of calcite and dolomite. The experimental results were compiled to establish an empirical correlation to enable predicating of contact angles and interfacial tension without the need for running the actual lengthy experiment. The correlation predicted results were validated by predicting the interfacial tension of one oil sample that was not part of the study and comparing the result with the actual interfacial tension experiment. This work enables us to have an initial estimate of contact angles and interfacial tension results without going through a lengthy experiment preparation and procedure. It can also be used to have an idea of capillary and rock wettability whenever the interfacial tension apparatus is not available or where a quick answer is needed.