

FRACTIONAL WETTABILITY AND PETROPHYSICAL PARAMETERS OF POROUS MEDIA

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Abstract This paper describes the effects of fractional wettability on flow properties. The synthetic cores are made of mixtures of a fraction $1-f$ of water-wet sand and a fraction f of oil-wet sand (silicone-treated). The fraction f varies from 0 to 1. The wettability change induced by efficient chemical grafting of organo-chlorosilane molecules on sand was found to be stable over three months. Amott and USBM tests show that the wettability of the samples is reproducible. There is a strong relationship between the wettability indices and the fraction f of oil-wet sand.

The capillary pressure (P_c) and the relative permeability (k_r) curves of the samples were obtained in both drainage and imbibition. The resistivity (I_R) indices were measured.

P_c -curves exhibit a continuous evolution with f . At a given I_R , the brine saturation is larger for high f values. So, the saturation exponent n increases as f increases. The values of k_r (and I_R) are different in drainage and imbibition conditions and there is a strong correlation between the importance of hysteresis and the fraction f .