

Hydrocarbon Saturation Determination in Dispersed Shaly Sands Using the Waxman-Smits Equation

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The Waxman-smits equation is used to determine accurately the hydrocarbon saturation of shaly sands. The resistivity of shaly sands is much lower than the resistivity of clean sands, with same porosity and hydrocarbon saturation due mainly to high electrical conductivity of clay. The use of Archie equation would give a poor hydrocarbon saturation values for the shaly sands, especially if the clay is coated and sand grain homogeneously (that is a dispersed clay situation) while the Waxman-smits gives a more accurate value.

The paper examines the application of Waxman-smits which yields more hydrocarbon value than the Archie equation if the R_w , B , Q_v is much higher than 0.1. This will be the case if formation water is relatively fresh (low R_w), and/or if Q_v is high (montmorillonite clay/much clay) and/or at high temperature (high B).