

Unconventional NMR: Oil Sands, Cuttings and Core

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Abstract

Nuclear Magnetic Resonance (NMR) has long been used to analyze the permeability and porosity of consolidated rock cores from both conventional and unconventional reservoirs. This analysis has become an essential part of reservoir characterization and has expanded to include capillary pressure, diffusion, and various fluid mobility and fluid characterization measurements. Most of the analyses are done on consolidated or semi-consolidated rock cores, however, most drilling activities in unconventional reservoirs, such as Alberta's oil sands, do not yield consolidated core samples. In addition, much of the stratigraphy in Western Canada, including shale and tight sand intervals, has been archived with cuttings samples. For these cuttings or crushed samples, no procedures or methods have been established to determine permeability and porosity using NMR analysis.

Here we present new permeability and porosity data from cuttings/crushes material using NMR. In order to have meaningful conclusions, we analyzed the consolidated rock core prior to crushing and reanalysis. The new data is presented and implications discussed in particular in regards of expanding NMR analysis on a regular basis to investigate permeability and porosity of unconsolidated unconventional samples.