



Oil Sand 'Ore' Characterization Using Low-Field Magnetic Resonance

Yanping Niu*

University of Calgary, Calgary, Alberta, Canada
yniu@ucalgary.ca

and

Apostolos Kantzas

University of Calgary, TIPM Laboratory, Calgary, Alberta, Canada

Abstract

For the characterization of the unconsolidated oil sands, determination of the amount of bitumen, water and solids becomes necessary. Previous analyses showed that the bitumen and water content could be estimated by using the low-field magnetic resonance spectra. The critical relaxation time concept (T2 cut-off) was used to interpret the obtained spectra, and the results are promising. It is also found that in some cases, the spectra of clay-bound-water and bitumen overlap. This overlap introduces errors when determining the fluid content. Dean-Stark extraction can be considered as a standard to calculate the bitumen, water and solids accurately. However it not only destroys the sample but is time-consuming and economic inefficient. In this paper, we combine the low-field magnetic resonance technique with a densitometry technique, a pore volume measurement, to provide a more accurate estimation of solids content. Pore-volume measurement uses the gas-expansion principle and a density algorithm to determine the fluid and solid content. It is a fast and non-destructive experimental method. In addition, a new deconvolution algorithm instead T2 cut-off is applied to differentiate each fluid component. The paper present the results to date.