
Source Rock Evaluation of the Smackover Formation in Southern Arkansas

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EXTENDED ABSTRACT

Core samples from three wells in southern Arkansas were collected for evaluating the organic matter richness and type of the Smackover Formation. All but seven samples exhibited low present-day total organic carbon (TOC), ranging from 0.04 to 1.24 wt. % with a median of 0.12 wt. % and an average of 0.20 wt. % (Table 1). Seven samples with TOC greater than 0.5 wt. % were analyzed by Rock-Eval (Table 2). Pyrograms indicate a low temperature pyrolysis (S2) shoulder in all samples, suggesting that petroleum carried over into the S2 peak. To obtain total oil yield (S1) from this data, solvent extraction was conducted on these samples prior to repeating Rock-Eval pyrolysis. The reduction of S2 (S2 whole rock minus S2 extracted rock) was added to whole rock S1 to obtain total oil content based on this data alone (Jarvie, 2012); however, evaporative losses of oil are not included. Oil saturation index (OSI) ($S1 \times 100/TOC$) indicates that oil crossover effect (OSI exceeds 100 mg hydrocarbons [HC]/g TOC) is common among the samples, which is a geochemical indication of potentially producible oil if volumes warrant (Jarvie and Baker, 1984). T_{max} for the extracted rock samples varied from 444 to 449°C, indicating sample maturity is in oil window. Hydrogen index (HI) values range from 56 mg/g to 148 mg/g, with a median of 114 mg/g and an average of 105 mg/g. Based on the thermal maturity from either T_{max} or bitumen-equivalent vitrinite reflectance values, HI values are reduced by approximately 80% from original values.

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