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**Application of Reservoir Geochemistry to Heavy Oil, Venezuela**

Reservoir geochemistry application to the Petrozuata heavy oil (7-10 API gravity) field helped address the origin of excess gas, map out fluid properties (API gravity, viscosity) and understand reservoir connectivity. The main problem confronted was to determine to what extent variation in the fluid viscosity and reservoir connectivity controls well flow rates. Viscosity is a key factor in the mobility factor for well rates as well as the extent of drainage. In addition, it was desirable to determine if tar mats or high viscosity zones existed that would not contribute to total reserves or lower well flow rates.

Gas chromatography and gas chromatography-mass spectrometry (GCMS) was applied to several oil (12) and sidewall core (263+) samples from 30+wells in the field to determine the main control on fluid properties. The main control on fluid properties was suggested to be water washing.

An equation using biomarkers was developed that correlated with dead oil viscosity for several oil samples. The same equation was used to calculate viscosity from sidewall core samples of several samples throughout the field and from multiple sand zones.

Stratigraphic analysis in the field indicated that stratigraphically lower sands are more amalgamated and thus better connected for fluid flow. This is consistent with the stratigraphically lower sands (4A to 6 zones) having a more homogeneous calculated viscosity and API gravity. Calculated viscosity data are more variable for shallower sands which are not as amalgamated. Chemically, oil in sequence 8-9 sands appears to be distinct from oil in the lower sequence 5-1 sands indicating a significant barrier or seal to fluid flow in the field.