

Hydrocarbon Charge Assessment, Gulf of Mexico: Rates of Oil/Gas Generation from Source Rocks and Oil Asphaltenes

Daniel M. Jarvie¹, Alejandro Morelos¹, Roger Sassen², Pierre-Yves Chenet³, and Jeffrey W. Brame⁴. (1) Humble Geochemical Services, P.O. Box 789, Humble, TX 77347, phone: 281-540-6050, fax: 281-540-2864, danjarvie@humble-inc.com, (2) Geochemical and Environmental Research Group, Texas A & M University, 833 Graham Road, College Station, TX 77845, (3) BEICIP, 11767 Katy Freeway No. 840, Houston, TX 77079, (4) Brame Consulting, 12010 Whittington Dr, Houston, TX 77077

Analysis of petroleum systems from oil geochemistry in the Gulf of Mexico has provided inferences regarding sources for hydrocarbons. Source rocks from the Tertiary and Cretaceous have been reported in Mississippi Canyon. Other Cretaceous source rocks have been described from cores at DSDP Site 535. While these data and inferences from inversion of oil geochemistry provide very solid evidence as to the formations that are sourcing oil and gas deposits, they do not provide the data necessary to predict accurately hydrocarbon charge. Hydrocarbon charge is dependent not only on identification of the effective source of oil and gas deposits, but also the timing of hydrocarbon generation, expulsion, and entrapment. The timing of hydrocarbon generation is a function of the rate of source rock decomposition (kinetic parameters) under a given burial and thermal history.

Bulk and compositional kinetic parameters measured on Tertiary source rocks show very broad hydrocarbon generation rates and much higher yields of dry and wet gas. DSDP Site 535 Cretaceous source rocks show considerable variation in the rates of hydrocarbon generation. Jurassic source rocks also show variable hydrocarbon generation rates that appear to be a function of the sulfur content.

These kinetic data provide the ability to accurately model hydrocarbon charge – oil and gas - using sophisticated models appropriate for the Gulf of Mexico.