

Origin of Petroleum in the Mexican Gulf Coast Basin

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Several generation models for petroleum generation have been proposed for the Mexican Gulf Coast Basin. Various oil/oil and source rock/oil correlations have been postulated relying on bulk oil features as well as isotopic and biomarker compositions. The tectonic evolution of this area has been a main control of the source rocks and the physico-chemical variations of their related oils.

The best Mexican source rocks are related to the rift tectonic stage. Individual structural blocks developed during this stage had different suites of sedimentary facies because of variations in subsidence rates. In the grabens, deposition occurred in organic-rich anoxic marine carbonate environments from Oxfordian until Tithonian times. Variations in salinity, oxygen depletion levels, and clay and carbonate content can be identified by the molecular features of their related oils. Tithonian oils have a widespread distribution throughout the Mexican Gulf Coast Basin from the Tampico-Misantla Basin to Campeche Sound.

Marine carbonate platforms were developed during the sag stage from Neocomian until Middle Cretaceous times.

During this stage, thick carbonate sequences were deposited in the Tampico-Misantla, Veracruz, Campeche Sound, Chiapas-Tabasco, Sierra de Chiapas, and Yucatan areas. Cretaceous carbonate rocks may contain fine stringers of oil-prone organic matter, probably the remains of bacterial mats, and as a result they could be source rocks for produced oils. The oils related to these environments are present in the Veracruz, the Chiapas-Tabasco, and the Sierra de Chiapas areas.

As elsewhere in the Gulf of Mexico Basin, the Tertiary in the Mexican Gulf Coast was a time of deltaic sedimentation. Tertiary source rocks were capable of sourcing gas and condensate, and perhaps some light oils. Tertiary oils are mainly produced in the Burgos and Macuspana basins. Their molecular features suggest a source from reworked terrestrial higher plants deposited in siliciclastic anaerobic depositional environments.

This diversity of generative subsystems in the Mexican Gulf Coast Basin can explain the huge petroleum potential of this area.