COUPLING OF SECONDARY CRACKING AND RETENTION PHENOMENA DURING PETROLEUM GENERATION AND EXPULSION: APPLICATION TO THE GOMO MB. SOURCE ROCKS, RECONCAVO BASIN, BRAZIL

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The Recôncavo Basin is a Late Jurassic-Early Cretaceous asymmetric rift in Northeastern Brazil. The syn-rift lacustrine shales of the Gomo Mb. (Candeias Fm., Neocomian) have been recognized as the most important source rocks, containing type I kerogen.

Aiming to understand the compositional changes during petroleum generation and expulsion, Gomo Mb. samples from wells throughout the basin, with varying organic richness and maturity, were analyzed by Rock-Eval and preparative pyrolyses, whole-rock and kerogen extraction, and liquid and gas chromatography. With increasing maturity, saturates increase in total C_{15+} extracts (whole-rock + kerogen extracts), whereas aromatics and NSO's remain almost constant, indicating that partial secondary cracking of the latter occurred within source rocks before expulsion.

The individual role of secondary cracking and retention phenomena in extract composition was modelled with IFP's Temispack software. After calibrating thermal maturity indicators along a cross-section in the basin's Southern Compartment, petroleum generation was modelled with compositional kinetic data derived from open-system pyrolysis and specific secondary cracking kinetics assigned to compound classes. Using the same frequency factor, an activation energy for secondary cracking of NSO's and aromatics slightly higher than that of the main primary cracking reaction allowed a good calibration of extract compositions. When coupling petroleum generation and expulsion, a retention factor of around 50% for NSO's and no retention for saturates and aromatics in source rocks accounted well for the composition of reservoired oils in two oilfields. Secondary cracking after expulsion is not important for changes in oil composition in our section.