Biomarker Characterization in Neutral and Acidic Fractions of Oils from a Southern Offshore Brazilian Basin

S. G. de Lima¹, L. Koike¹, F. A. M. Reis¹*, E. V. Santos Neto², J. R.Cerqueira².

¹Instituto de Química, Universidade Estadual de Campinas, CP 6154, Campinas, 13.083-970, SP, Brazil*
  famreis@iqm.unicamp.br
²PETROBRÁS/CENPES/PDEX/P/GE0, Rio de Janeiro, Brazil.

The studied oil samples were collected in a field located offshore Southern Brazil. Since our main interest was biodegradation, we selected oils samples from three different reservoirs with different levels of biodegradation: A (Lower Cretaceous sandstones); B (Albian/Cenomanian carbonates) and C (Tertiary sandstones).

Analysis of neutral biomarkers in the three samples reveals that these oils have saline lacustrine origin according to the geochemical classification given by Mello et al. (1988) and Peters and Moldowan (1993). These oils are biodegraded and it is still possible to identify an increasing order of biodegradation A < B < C.

Geochemical characterization of hydrocarbon derivatives from the acidic fraction in the studied oil samples (A, B and C) confirm the evidence regarding the origin and biodegradation of the neutral fractions. The acidic components showed a great similarity among the linear, hopanic and the steranic acids within the three oils. The presence of sesquiterpanic acids (C₁₅ to C₁₇) and the absence of their neutral counterparts in the neutral fraction suggest that these compounds are due to bacterial degradation of higher terpanes in reservoir (Koike et al., 1992).

The most striking features of these oils are shown by the presence, in the neutral fraction, of a homologous series of n-alkylcyclohexane. Their relative composition in the three oils allowed us to confirm the biodegradation intensity in the following sequence A < B < C, that is the same pattern observed in the n-paraffin GC traces and hopane (m/z 177 and 191) profiles. However, their acidic counterparts have not been found in the respective acidic fractions. It has been suggested a common genetic relation between n-alkylcyclohexane and n-alkanes (Fabianska et al., 2003), probably due to bacterial organic matter contribution.

Keywords: acidic biomarkers, saline lacustrine oils, biodegradation, Brazilian oils.

References:

