Geochemical Correlation of Brazilian Oils
Based on the Analysis of Aromatic Hydrocarbons

L.S.M. Wiedemann¹, A.P.B. do Carmo¹, F.T.T. Gonçalves²³, D.A. Azevedo¹

¹Departamento de Química Orgânica, Instituto de Química, Universidade Federal do Rio de Janeiro, CT, Bloco A/603, Ilha do Fundão, Rio de Janeiro, 21949-900, Brazil, larissa@iq.ufrj.br; ² GIMAB/LAB2M/COPPE/UFRJ, Ciudad Universitaria, Centro de Tecnologia, Bloco I-2000 (anexo), Rio de Janeiro, Brazil, 21949-900; ³ PGT-Petroleum Geoscience Technology Ltd., Rua 2 s/n, Incubadora de Empresas da Coppe, Ciudad Universitaria, Caixa Postal 68.568, Rio de Janeiro, Brasil, 21.945-970.

During the last two decades, a number of studies have performed biomarker analysis of oils from the Brazilian marginal basins (e.g. Mello et al., 1988), leading to the characterization of oil families derived from source rocks deposited under distinct environmental conditions: lacustrine fresh-brackish water and saline, and marine hypersaline, carbonate, anoxic and deltaic. Most of these studies were based solely on the analysis of saturated hydrocarbons, with little regard to the aromatic fraction despite the potential application of such compounds on the characterization of oil maturity and oil-oil and oil-source correlations (e.g. Radke & Welte, 1981; Peters & Moldowan, 1993; Li & Jiang, 2001).

In this work, a geochemical correlation of selected Brazilian oils was carried out using the results of GC and GC-MS analysis of aromatic hydrocarbons. Selected oil samples are representative of major lacustrine and marine oil families from the Brazilian marginal basins. The aromatic hydrocarbons of the selected oil samples were fractionated through liquid chromatography using a hexane and dichloromethane mixture (8:2), after the elution of saturates with hexane. The resulting aromatic fractions were submitted to Gas Chromatography-Mass Spectrometry (GC/MS) analyses using a Hewlett-Packard 5890A Gas Chromatographer coupled to Hewlett-Packard 5972 mass selective detector.

Besides the visual inspection of GC and GC-MS fingerprints, molecular ratios were used to differentiate and correlate the analyzed oils. Aromatic hydrocarbons distributions and relative proportions were markedly distinct among oils of different origins, in good agreement with saturates analysis results. Aromatic maturity parameters (e.g. methylphenanthrene index) also provided a better characterization of oil maturity, allowing the inference of source rocks maturity during oil expulsion.

Key Words: aromatic hydrocarbons, biomarkers, oil, Brazilian sedimentary basins, GC/MS analysis.

Acknowledgments: L.S.M. Wiedemann thanks CNPq for the Doctor scholarship.

References