Comparisons between the Diagenesis of Dioctahedral and Trioctahedral Smectite, Brazilian Offshore Basins

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Abstract: Burial diagenetic reactions of di- and trioctahedral clay minerals were compared in Brazilian offshore, basinal sediment sequences of Cretaceous age. Originally dioctahedral smectite-rich shales of three basins—Potiguar, Ceara, and Ilha de Santana—exhibited the classical smectite-to-illite burial pattern. Trioctahedral clay-rich shales and trioctahedral clay-mineral cements in sandstones, however, showed a burial sequence of saponite to mixed-layer chlorite/saponite with progressive increase in the percentage of chlorite layers with increasing burial depth.

The change from disordered to ordered interstratifications of chlorite/saponite occurred in the temperature range 60 ° – 70üC at a vitrinite reflectance value of about 0.65. These values are lower than those found for the ordering of illite/smectite clays. Increasing substitution of Al for Si in tetrahedral sites, followed by fixation of interlayer hydroxide sheets was found to be the major chemical change promoting transformation of saponite to chlorite via corrensite.

Key Words: Brazil • Chlorite • Corrensite • Diagenesis • Illite • Interstratification • Saponite • Smectite • Trioctahedral • Vitrinite reflectance

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