DIAGENETIC CLAYS IN A TIGHT SANDSTONE OF THE OLMOS FORMATION, MAVERICK BASIN, TEXAS

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ABSTRACT

In southern Dimmit County, Texas, the upper Olmos sandstone was deposited in a shallow marine environment. The sandstone is predominantly medium grained and moderately to well sorted, with the major components being quartz, plagioclase, volcanic rock fragments, and glauconite. Quartz plus chert comprise 80 to 88 percent of total grains. Plagioclase (albite) ranges from 5 to 10 percent in abundance. Volcanic rock fragments, consisting mostly of tiny albite laths which exhibit trachytic textures, comprise 3 to 5 percent of all grains. Glauconite ranges in abundance from 3 to 6 percent, and some intervals contain marine fossils.

Quartz overgrowths are well developed in all intervals, and in some they have molded and merged to seriously occlude porosity. In certain intervals precipitation of ferroan calcite followed quartz overgrowths and occluded residual porosity. Calcite cement is most abundantly represented in intervals containing calcite fossils. Much replacement of volcanic rock fragments and plagioclase grains by ferroan calcite has taken place. In addition to quartz overgrowth and ferroan calcite, pore-fill clays are abundantly present.

The clay fraction of these sandstones (-2 microns) consists of illite, chlorite, and kaolinite, with a predominance of illites. The latter mineral occurs with and without mixed-layering with expandable layers (smectites). These minerals were formed authigenically during diagenesis in the pores of the sandstone. Illites display the typical "hairy" morphology, with illite fibers "spider-webbing" into pores of sandstones. These fibers seem to grow on or from aggregates of illite-smectite mixed layers. Pseudohexagonal platelets of kaolinite form so-called book-shelf stacks. This strongly supports the authigenic formation of the kaolinite in sandstone pores. Chlorite occurs as bladed rosettes. The characteristic X-ray spectra of these chlorite blades show strong Fe and Si lines, suggesting an iron-rich variety of chlorite.

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