Active Components in Clay Condensates and Extracts as Potential Geocatalysts

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Abstract: Conversion of tertiary butylacetate to isobutylene and acetic acid and cracking of n-octane were used as model reactions to monitor the catalytic activity of a condensate and aqueous extract derived from a sample of montmorillonite. The condensate was obtained by condensing the vapor phase evolved on heating the clay and the extract was derived from the clay by prolonged water extraction. Both condensate and extract were colloidal systems, which were separated into solid and liquid fractions by distillation. Reactions carried out in a dynamic system established that the solid components acted as true acid catalysts, whereas the liquid fractions were inactive under the experimental conditions adopted. The catalytic activity per weight of the condensate exceeded that of either the parent clay or the extract.

The present results confirm that colloidal size catalysts of high activity can be generated from clays. Such materials, mobilized and transported alone or with formation fluids, may act as catalysts in places removed in space and time from their source. This finding refutes objections previously raised to the operation of bulk clays as catalysts for reactions with particulate organics and supports the concept that acid catalysts derived from clays may participate in organic geochemical reactions in an aqueous medium.

Key Words: Clay condensate • Clay extract • Geocatalyst • Octane cracking • Tertiary butylacetate decomposition

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