Physicochemical Properties of Montmorillonite Interlayered with Cationic Oxyaluminum Pillars

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Abstract: By ion exchanging expandable clay minerals with large, cationic oxyaluminum polymers, " pillars " were introduced that permanently prop open the clay layers. On the basis of thermal, infrared spectroscopic, adsorption, and X-ray powder diffraction (XRD) analysis, the interlayering of commercial sodium bentonite with aluminum chlorohydroxide, $[Al_{13}O_4(OH)_{24}(H_2O)_{12}]^{+7}$, polymers appears to have produced an expanded clay with a surface area of 200 – 300 m^2/g. The pillared product contained both Brönsted and Lewis acid sites. XRD and differential scanning calorimetry measurements indicated that the micropore structure of this interlayered clay is stable to 540 ° C. Between 540 ° and 760 ° C, the pillared day collapsed with a corresponding decrease in surface area (to 55 m^2/g) and catalytic cracking activity for a Kuwait gas oil having a 260 ° – 476 ° C boiling range.

Key Words: Catalysis • Interlayering • Molecular sieve • Montmorillonite • Oxyaluminum • Pillar

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