
Bleaching Properties of Alumina-Pillared Acid-Activated Montmorillonite

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Abstract: The bleaching of cottonseed oil by alumina-pillared (Al-pillared) acid-activated clays was investigated. Acid activation of a Ca-rich montmorillonite (CMS STx-1) following treatment with 1, 4, and 8 eq/L sulfuric-acid solutions, as well as subsequent pillaring with alumina, produces new materials. These materials have bleaching properties dependent upon the extent of activation of the clay prior to pillaring. The pillared acid-activated montmorillonites possessed higher bleaching efficiency compared to pillared products of the untreated clay. Mild activation of the montmorillonite matrix, pillaring with the Keggin ion $[Al_{13}O_4(OH)_{24}(H_2O)_{12}]^{7+}$, and calcination temperatures to 500° C produced materials with the best fractional degree of bleaching. Direct comparison to the performance of a commercial bleaching earth (Tonsil Optimum 214, Sud-Chemie AG, Moosburg, Germany) shows that the efficiency of the Al-pillared acid-activated montmorillonite may be improved. The optimization of the bleaching process is achieved via a judicious utilization of intermediate surface area, relatively high acidity, and enhanced pore volume.

Key Words: Acid Activation • Alumina-Pillared Montmorillonite • Bleaching • Clay • Cottonseed Oil

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