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Effect of milling time on the structure, particle size, and morphology of montmorillonite

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Abstract: In the current research, effect of milling on the structure, particle size and morphology of montmorillonite was investigated. For this purpose, the montmorillonite was analyzed by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and scanning electron microscopy (SEM). Then the montmorillonite was milled using high energy planetary ball mill at different milling times (1-60 hours). After that, the structure, particle size and morphology of all samples were investigated by XRD, FTIR, SEM, and transmission electron microscopy (TEM). Results showed that the ball milling causes the particle size reduction of clay and separation of the clay layers. Moreover, ball milling increases the overall structural disorder and transforms the crystalline structure into an amorphous phase. Also, the morphology of clay particle changes from layered to aggregates of almost rounded particles after 60 hours of milling.

Keywords: *Clay; montmorillonite; high energy planetary ball mill; morphology.*

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