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Segregation of bentonite components in order to achieve nano montmorillonite

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Abstract: Nano technology makes the possibility to achieve specific properties for materials. In this process, by reducing the size of materials in the range of nano size, new noticeable behaviour for material can be observed. Such behaviour cannot be observed for larger particles from that material. Bentonite soils contain more than 76% montmorillonite and some other minerals. Pure montmorillonite with nano size has a vast industrial application in which its production is relatively costly and time consuming. This research is aimed to propose a method for segregation of bentonite components to reach nano montmorillonite. To achieve this objective, a mechanical method is proposed. Based on this method, a nano montmorillonite with micro and nano size is achieved. The segregation process is monitored with PSA, XRD, SSA and SEM experiments. The results of this research show that a nano montmorillonite with SSA of 522.58 m^2/g and average diameter of 6.13 micron is attained. The achieved nano montmorillonite has larger purity in comparison to Cloisite Na^+. In addition, it has lower average particle size than Cloisite Na^+. Furthermore, according to the results of this research the extracted nano clay is free from carbonate and quartz particles. The SSA of this nano montmorillonite was 25% more than that of bentonite. The proposed method is relatively inexpensive. Moreover, since no chemical is used in its production process, it is a suitable sample for practical, research, and industrial projects.

Keywords: *Nano-clay; bentonite; montmorillonite; Cloisite Na^+; XRD; SEM; SSA.*

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