
Freeze-Dried and Thawed Clays

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Abstract: Heating montmorillonites to their dehydroxylation temperatures destroyed their ability to form an aerogel. The breakdown of the aerogel structure coincided with the loss of hydroxyl water from the montmorillonite. Apparently, this loss of water was accompanied by a loss of the layer charge. Particle size and aerogel-forming ability appear to be inversely related properties for at least some montmorillonites. The kaolinite investigated did not form an aerogel in any size fraction. The formation of montmorillonite aerogels from various concentrations of clay was investigated. The texture and physical appearance of these aerogels was examined and presented herein.

Thawed clay suspensions exhibited a variety of behaviors. The Volclay bentonite, which apparently formed a true sol was unaffected by freezing. In all other clays at least some of the fine clay particles agglomerated on freezing and large clumps were observed dropping out of the melting ice. After stirring the thawed suspensions less clay was dispersed than in the unfrozen suspension counterparts. Addition of a dispersing agent to these suspensions caused more clay to remain dispersed following freezing-thawing-stirring.

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