Clay Polymer Nanocomposite for Efficient and Rapid Removal of Organic Matter From Water

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The global water crisis has gotten worse while freshwater sources around the world are being reduced and the quality of the water is in a constant decline. Surface water pollution is caused by a wide variety of natural and unnatural substances found in water in different concentrations. Dissolved organic matter (DOM) is a mixture of natural molecules found in all surface water sources. At high concentrations, DOM causes an undesirable odor, color and taste in the drinking water and even reacts with chlorine creating harmful substances that affect human health, some are found to be carcinogenic. In water treatment facilities, DOM brings upon several problems, mainly the enhancement of biofilms growth on pipelines and membranes, which impairs the efficiency of the facilities. In my research, I have developed and characterized a novel, hybrid, clay polymer nanocomposite, for efficient and rapid DOM removal. I examined the adsorption kinetics of a granular and powdered nanocomposite. A comparison was made between the nanocomposite and the most common industrial sorbent, activated carbon in the two sorbents forms (powder and granules). The results of the study show that the composite is an extremely efficient sorbent for DOM removal and demonstrates fast adsorption kinetics. In addition, the nanocomposite was superior to the activated carbon, four times higher efficiency. This research examined an applicable approach for industrial solution for DOM removal. The study has shown that clay polymer nanocomposites can be an alternative sorbent for water purification.

Awards Won: