Leading the Environment with Less Lead, Nano-Structured Jordanian Kaolinite for the Removal of Lead from Industrial Waste Water

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Kaolinite, a natural deposit in Jordan has been proved it can be used for removal of toxic heavy metals from water. This study aimed to remove lead ions from industrial waste water using Nano-structured modified kaolinite (NK-ASP) clay made by shaking grinded kaolinite with concentrated hydrochloric acid then citric acid followed by an aqueous solution of an amino acid: aspartic. In our attempt for increasing the adsorption of kaolinite for heavy metals, kaolinite was treated with concentrated hydrochloric and citric acid. Analyses of kaolinite by XRD and XRF revealed removal of some of the alkali metal oxides. Kaolinite samples were treated with 32%HCl followed by 20%citric acid (C6H8O7) and examined using SEM which showed a decreasing sized pattern of kaolinite particles. Results indicated that treating 10g of kaolinite with 32%HCL followed by 20%citric acid only is less effective in removing lead ions than a comparable 10g sample of kaolinite treated with 32%HCl, 20%Citric and 0.02% of aspartic acid (C4H7NO4). 81 % and 99.3% reduction in water lead content (measured using ICP-MS), were obtained respectively. This study succeeded in an average removal of 99.7% of lead content by (NK-ASP). A prototype was designed using NK-ASP as a model for the removal of lead ions from aqueous solutions. We believe we have achieved an efficient nanotechnology process to treat polluted water from heavy metals suitable for industries and localities. The NK-ASP can be employed for the removal of heavy metal pollutants in environmental, medical and industrial applications.

Awards Won:
Second Award of $2,000
Drug, Chemical &amp
Associated Technologies Association (DCAT): First Award of $3,000.
King Abdulaziz &amp
his Companions Foundation for Giftedness and Creativity: Award of $1,000 for Water Technology