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Production and characterization of graphite oxide based super sand and investigation for fluoride adsorption capacity

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Drinking water purification is an important process to be carried out using globally accepted norms. In particular, low water quality reported areas, the need to have well-established procedure is unavoidable. Sand filters are central unit process for any drinking water purification process. Although sand gravels can remove turbidity from water in commercial water treatment plants, there is always a quest to enhance the effectiveness of the sand filtration process. The effectiveness of sand filtration process can be augmented if sand is coated with oxides of graphite which does not occur in nature, unlike sand and graphite. The composite material, where sand gravels are covered by layers of graphite oxide, is called "Supersand". In this work, production and investigation of surface properties of "such Supersand" material and how such composite material responses to the absorption of fluoride ions from water are reported. Here, graphite was oxidized using Modified Hammerd method and synthesized graphene oxide was coated onto washed sand particles. Repeated coating of graphite oxide on sand resulted in a composite that is more stable in water. FTIR, SEM/EDXA and XPS are used to characterize the composite material as well as individual precursor materials (i.e., sand gravel and graphite). Surface titrations methods are used to evaluate the ion adsorption capacity of sand ravels and "super sand". According to FTIR results, following the oxidation, the basel plane of graphite become functionalized with O-H, C=O, C=C .And the fluoride adsorption process of the supersand is physisorption process. It was also noted that, according to the results, 5 times graphite oxide coated supersand has high fluoride adsorption capacity than the single coated super sand.

Keywords: Super sand, drinking water, purification, Fluoride