Reusable EDTA Modified Magnetic Graphene Oxide Nanoadsorbents: Its Adsorption Behavior on Organic Pollutants and Bacterial Pathogens in Aqueous Solutions

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Organic pollutants cause detrimental effects to aquatic communities living in them; thus, becoming a threat to the Philippines' river water system. To address this, graphene oxide was magnetized, functionalized and characterized as adsorptive agent. EDTA modified magnetic graphene oxide (EDTA-mGO) is the final product of the anchoring of EDTA onto Fe_3O_4 nanoparticles that are functionalized with graphene oxide (GO). EDTA-mGO has shown great adsorption capacities and reproducibility on heavy metals. In this study, methylene blue, a pollutant discharged daily from textile mills into open bodies of water, is the model organic compound utilized to evaluate the behavior of EDTA-mGO for the removal of organic pollutants and bacterial pathogens from aqueous solutions. The results from the FTIR, and observed results from the XRD, and SEM characterization shows the successful co-precipitation of Fe_3O_4 nanoparticles and EDTA functionalization of GO. Time and weight were the parameters for experiments involving organic pollutant adsorption. The reusability of EDTA-mGO was evaluated in river water spiked with MB. The adsorption performance of GO and EDTA-mGO was compared and their adsorption performance with Escherichia coli was observed and reported. Data shows that 0.05 g of EDTA-mGO is able to remove 92.39 % of MB and t-test for Independent Sample t-test at 0.05 α level showed that there was a significant difference between the adsorption performance of GO and EDTA-mGO; wherein EDTA-mGO has the better adsorption performance. Adsorption performance for E. coli, however, saw percent removal decreasing as adsorbent dosage increases in both GO and EDTA-mGO. Keywords: EDTA-mGO, methylene blue, nano-adsorbent, Fe_3O_4, adsorption performance, reusability, Escherichia coli