Synthesis and Characterization of Water Stable Composite for Confiscation of Arsenic and Lead from Water with Adsorption Studies

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Abstract

Statistic expectations reveal that over 1000 million people living in arid regions can be definitely challenged with unpolluted water scarcity in 2025 due to accepted solvent assets of water and urbanization, industrialization. Metal-organic frameworks (MOFs) based composite are the splendid materials used for the purification of water. In this study highly water stable Mn-PBA/GO (Manganese Prussian Blue Analoge/ Graphene Oxide) was successfully synthesized by using simple hydrothermal technique in excellent yield and characterized via the use of FTIR, SEM, BET, XPS, UV and XRD. From the characterization it was showed that this composite contains noticeably porous structure and can be castoff for the confiscation of heavy metals arsenic and lead from water by means of adsorptive method. The adsorption behavior of arsenic and lead was studied by using Mn-PBA/GO in water medium. The adsorption kinetics of arsenic and lead metals followed by kinetic model (pseudo second order). Mn-PBA and Mn-PBA/GO exhibits excellent adsorption capability 188.39 mg/g and 1162.52 mg/g for Pb(II), 56.28 mg/g and 262.36 mg/g for dimethyl arsenate (DMA), 66.65 mg/g and 383.52 mg/g for As(III), 82.19 mg/g and 497.49 mg/g for As(V) respectively. The adsorption mechanism, Langmuir was well fitted and having maximum R2 values for both metals. This selective adsorption is mostly due to existence of electrostatics, hydrogen bonding and π-π stacking interaction between composite and heavy metals present in the water. Recycling of composite (five times) also represent good results as much as 95%. From these results it was revealed that Mn-PBA/ GO composite can be used for the removal of arsenic and lead as well as organic arsenic from waste water. From this study it was established that an upsurge in the number of active sites can dramatically improve the adsorption capacity of adsorbent for the removal of pollutants from water.

Biography:

Khalil Ahmada Food Engineering and Biotechnology at the Free University of Bolzano (UNIBZ) under Prof. Di Cagno supervision.

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