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SYNTHESIS OF MAGNETIC BIOCHAR FOR THE REMOVAL OF ARSENIC FROM AQUEOUS SOLUTIONS

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Arsenic is a chemical that causes cancer, and it has been linked to numerous cases of poisoning due to its contamination of groundwater. In India consumption of arsenic even in small amount causes many diseases such as lung cancer, skin infection and prolonged consumption leads to ‘arsenicosis’. Precipitation, membrane processes, ion exchange, and adsorption are techniques for removing arsenic from water, but these systems suffer from high investment costs, difficult operations challenges with recovery, and poor adsorption capacity. This study developed an arsenic removal adsorption material based on biochar with improved adsorption characteristics and simple recovery to address these challenges. Waste wood may easily be converted into biochar, which is a cheap and sustainable. $FeCl_3$ and $KMnO_4$ also increase the effectiveness of As(III) elimination. The goal of this study is to determine the best operating conditions by examining the impacts of various dosages, pH levels, and starting concentrations. Adsorption isotherms and the kinetic mode were used to investigate the adsorption mechanism between As(III) and biochar. Scanning electron microscope (SEM), X-ray diffraction (XRD), surface area Brunauer–Emmett–Teller (BET), Fourier transform infrared (FTIR) and point of zero charge, the morphological analysis and physicochemical characteristics of the magnetic biochar (MB) were assessed. The MB has a specific surface area of 266.564 m^2/g, according to the BET study with a removal efficiency about 90%. The presence of multiple aliphatic and aromatic stretching bonds of carbon and band spectrum of alcohols, is revealed by FTIR analysis. Fe and Mn elements are visible and also the confirmation of Fe_3O_4 is confirmed through (XRD). Heterogeneous adsorption is followed by the As(III) as Freundlich model fitted the best. The first pathway is the physical adsorption of As(III) ions into the pore of biochar. When the biochar surface is coated with a positive charge in the second pathway, they come into contact with each other by electrostatic force.

Keywords: Water remediation, Arsenic Removal, Magnetic Biochar.