

Hardness Removal Using Graphite-based Nano Materials

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Water hardness creates substantial issues both in health sector and in industry. In regulatory agencies hardness in drinking water is often categorized as a secondary contaminant in that its regulation is not mandatory. However, high hard waters are not palatable. The hardness in the water is defined as the presence of di- and trivalent cations. However the removal of hardness from water is no easy task. Ion exchange resins were commonly used to control drinking water hardness which creates reject water enriched with monovalent cations. The methods based on sorption offers several advantages as such they are economical and do not require high technology. Further most of the adsorbents are readily available. The major limitation of the method is its efficiency. This project aimed at determining developing substrate to remove divalent cations from drinking water using nano Grapheneoxide (GO). GO was synthesized from natural vein graphite of Sri Lanka. Grapheneoxide (GO) was synthesized using the modified Hummer's method. Results showed that the suitable pH for calcium removal was pH 10 but there is a Calcium removal below pH 8 (pH 5.5 to 7) and the optimal concentration was 50 ppm. Equilibrium isotherms have been analyzed using Langmuir and Freundlich isotherm models. The adsorption data were fitted well in Langmuir isotherm than Freundlich isotherm for GO. GO was characterized using Scanning Electron Microscope (SEM), Energy Dispersive X-ray Spectrometry (EDS), Fourier Transform Infrared Spectroscopy (FT-IR) analysis and X-ray Diffraction (XRD) and the results were in good agreement with the literature. Calcium adsorption isotherms were also prepared to assess its applicability for water industry.

Keywords: Water hardness, Drinking water, Graphite, Grapheneoxide, Nano material