Evaluation of Water Treatment Residue as a Sorption Medium and its Application to Control Phosphate Level in Water

Abstract - Wastewater treatment residual material, WTR, from a local drinking water facility in Baghdad, was evaluated as a potential medium for the removal of some unwanted species from water. The material was first characterized by chemical composition, X-ray diffraction and infrared spectral analysis prior to its use as an adsorbent. The x-ray revealed that the material is a calcium-based water treatment residue mixed with silica and impurities of oxides like MgO and Fe₂O₃. The adsorption characteristics of the material were evaluated by studying the adsorption of methylene blue. The cation exchange capacity and the surface area had values of 10.5 mmol per100 g and 87.5 m².g⁻¹, respectively. The sorption capacity of the material was applied to control the phosphate concentration in water. Time and adsorbent amount have played significant roles in the removal of phosphate from water. An adsorption capacity had a value of 1.6 mg PO₄³⁻.g⁻¹ of WTR.

Keywords - Kaolin-polyacrylamide composite, Nickel adsorption, experimental design; optimization, adsorption (efficiency and capacity)