**Using 2-HEC Films Included nano-SiO2 for Removal of Phosphate and Nitrate Ions in Water**

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Hydroxyethyl cellulose (HEC) is hydrophilic biopolymers with low charge density. HEC is recognized as one of the natural macromolecules polysaccharides that comprised from b-D-glucose rings at the main chain. Strong hydrogen bonding among the hydroxyl groups of HEC makes it available to be employed in extensive utilizations due to its water solution properties. Indeed, the remarkable physical properties associated with cellulose polymers is accumulate from their water and organic solvent solubility, thermal plasticity, thickening and colloid stabilizing abilities. Thereby, the chemical composition of HEC will allow to occupied large amount of relatively easily accessible hydroxyl units that can be attached by a number of functional groups [1].

Superfluous phosphorus contained in wastewater from municipal, industrial and agricultural activities can cause eutrophication and hence deteriorate water quality. Nowadays, the treatment technologies applied to phosphate removal mainly include biological removal, chemical precipitation by ferric or aluminum salts, ion exchange, and adsorption, etc. However, these technologies usually cannot perfectly follow the increasingly stringent regulations on the phosphate discharge in a cost effective manner. Therefore, it is worthwhile to explore feasible technologies to capture, recover and reuse the phosphorus in wastewater. Adsorption seems to be attractive for the phosphate removal due to its simplicity of operation, low cost and the possibility of phosphate recovery. Various materials have been studied as the phosphate adsorbents including dolomite, zeolites, blast furnace slag, banana stems, mesoporous silicates, iron oxides, aluminum salts, and so on [2].

On the other hand, there has been serious global concern in the recent decades regarding the high concentration of nitrate in drinking water. Nitrate pollution can be originated from agriculture and urban runoff, disposal of sanitary and industrial wastes in an unsafe manner, leakage of infected systems, and run off from dustbins. High solubility of nitrate in water can lead to a widespread groundwater nitrate pollution that causes drastic risk for supplies of dinking waters and ecological disorders. High concentrations of nitrate in drinking water cause health problems such as methemoglobinemia in infants and stomach issues in adults [3].

In this work, 2-HEC (2-Hydroxy ethyl cellulose) films which included various amounts of nano-SiO2 were synthesized. Then the films were characterized by FE-SEM, FT-IR and XRD. After all synthesis and characterization technique we used the films as an adsorber for phosphate and nitrate ions in water. We tested them in use chromatographic separated methods.

**References**

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