Copper Oxide Nanoparticles for Adsorption of Phosphate in a Novel Gel-loaded Delivery System

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High levels of phosphate are a problem in the northern United States, where they can result in algae blooms and eutrophication. This experiment looked to find a way to adsorb phosphate using copper nanoparticles in a alginate gel bead capsule. This was supposed to be able to adsorb the phosphate, without allowing nanoparticles to leach into the water. To begin with, nanoparticles were synthesized using a wet chemical synthesis method. Phosphate standards were made, and a serial dilution was performed and reacted with ascorbic acid reagent in order to get a Beer's law curve. This curve was then used to get phosphate concentrations from the absorption at 625 nm. The copper nanoparticles were then implanted into alginate gel beads, and retested in the spectrophotometer to see their effectiveness at adsorbing phosphate. I found that the copper nanoparticles were effective at adsorbing phosphate. As the amount of copper nanoparticles increased, the amount of phosphate decreased. Furthermore, by incorporating the copper nanoparticles into the alginate gel beads, the amount of phosphate adsorbed was not decreased, even increasing on occasion. This method shows promise not only as a way to remove phosphate from water in the north, but also as a way to adsorb arsenic from the water of the nearly 35 million people affected by arsenic contaminated water in West Bengal. Because most methods of detection of phosphate work for both arsenic and phosphate, this method should be applicable to arsenic cases as well.

Awards Won:

Fourth Award of $500