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Passive elimination of heavy metals by spent chai tea

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Heavy metals are prevalent contaminants in residual, domestic and industrial wastewaters. Their common removal includes the use of expensive and impractical techniques such as chemical precipitation, ionic exchange, reverse osmosis and adsorption. This project proposes the use of spent chai teabags (CT) as naturally-occurring materials with great potential for the adsorption of divalent cobalt, copper and zinc ions from aqueous solutions. The maximum adsorption capacity was achieved by the optimization of the equilibrium experimental parameters like pH, adsorbent dose, initial metal concentration, time and presence of interfering salts. Experiments were carried out in batch conditions at room temperature. Results indicate that copper (II) ions were more efficiently adsorbed onto CT, followed by zinc and cobalt ions. Highest adsorption capacity was observed when using 150 mg of CT, with an initial pH of 2 and in the absence of salts. Time-dependent experiments indicate that less than 1h is needed to complete the process. Adsorptive properties were also studied by instrumental analysis, before and after the adsorption. These techniques included Fourier-transformed infrared spectroscopy, thermogravimetric analysis and scanning electron microscopy to elucidate the adhesion mechanism onto the chai tea leaves.

Biography

Lianhua Shen is sophomore student at BMCC, majoring in Engineering and Science, respectively. He/She has been working under the mentorship of Professor Navarro since this past May 2014 in the bioremediation of heavy metals from solutions. His/Her long-term goals include specializations in Food Chemistry and Organic Chemistry at their respective senior colleges.