Biochar Filtrate: A Novel Solution to Lead Contamination through Adsorption

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Lead contamination in water systems is responsible for widespread chronic diseases around the world. Especially in underdeveloped countries, where lead contamination is prevalent, a cost-effective and sustainable solution is needed to decrease the amount of lead in water. The purpose of this project is to determine if biochar could be used to mitigate aqueous lead contamination. Biochar made of waste soybean pods, coconut shells, and citrus peels were tested for lead adsorption capabilities through gravimetric analysis. Biochar was first immersed in .10 M lead nitrate solution for 24 hours. The remaining solution was decanted and reacted with potassium iodide. The precipitate, lead iodide, was massed. The change in moles of lead indicated the amount of lead adsorbed by the biochar. Crushed, cut, and used biochar were all effective in adsorbing lead ions, but cut soybean pod biochar was the most efficient, adsorbing 3 times the amount of lead than cut citrus biochar. Cut soybean biochar had the highest ratio of moles of lead adsorbed per milligram of biochar (0.134 mols Pb/mg biochar). In addition, when testing for reusability, used soybean pod biochar also had the highest ratio (0.138 mols Pb/mg biochar) in comparison to other biochar. Both citrus peel and coconut shell biochar demonstrated greater adsorption when surface area increased. In conclusion, soybean pods had the greatest adsorbance for lead. Biochar was found to be a cost-effective and sustainable solution to combat lead contamination and prevent chronic health diseases that arise from lead exposure.

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