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Elimination of Pb in aquatic systems employing biomaterials and adsorption processes.

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Elimination of Pb in aquatic systems employing biomaterials and adsorption processes.

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The surficial lentic, lotic, and subterranean aquatic systems have been seriously damaged by contaminants, decreasing the water quality and affecting humans and the development of ecosystems.

Heavy metals are among the primary pollutants that may reach high environmental levels through anthropogenic processes such as mining. In this study, we focused on lead due to its toxicity and presence in many mining zones of México.

Bioremediation is a nature-based option within the restoration processes. This method involves the biological activity of the organisms or the use of their residues. Biomaterials are compounds composed of a fragment of an organism or organic matter subjected to physical, chemical, or biological processes.

Adsorption may be an alternative for decreasing metals' concentrations. For example, biomaterials developed from fruit wastes may be used as adsorption surfaces to remove contaminants from water bodies.

This project aims to determine the lead adsorption capacity of biomaterials generated from fruit residues such as orange peel, tamarind seeds, and avocado seeds, in addition to characterizing the process kinetically and obtaining the isotherm that describes the process.

The experimental development consisted of three steps: the first one was obtaining the organic matter, the second was the generation of biomaterials, and the third batch experiments to determine the kinetics of the process, in addition to determining the Freundlich, Langmuir, and Temkin isotherms.

As preliminary results, it can be stated that the biomaterials generated in this project have a broad affinity for lead. Furthermore, the analysis showed that the process is mainly due to chemisorption and corresponds to the Freundlich isotherm, which indicates that the process is multilayered. And that the adsorption capacity decreases as the solution concentration increases.