

SESIÓN DE PÓSTERS

Mitigación y Remediación

P258. Application of waste of yerba mate (*Ilex paraguariensis*) for the removal of thallium from aqueous solutions

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Thallium (Tl) is widely used in industry for manufacturing of different products. Thallium has been recognized as one of 13 priority metal pollutants by the USEPA. It is mainly present as monovalent [Tl(I)] and trivalent [Tl(III)] ion, and each oxidation state shows a different toxicological behavior. The monovalent species show a similar ionic ratio to potassium ions, which is associated with disorders of metabolic processes involving potassium. Tl(I) species quickly enter the bloodstream and can be accumulated in bones, renal medulla, liver, and the central nervous system. To date, there are few biosorption studies reporting the elimination of Tl(I) from the environment. The aim of this work was to investigate the biosorption of Tl(I) on the surface of wastes generated from the consumption of mate, a traditional South American infused drink. The selection of the biosorbent was based on its characteristics of being a daily waste generated from a human activity in Argentina, while it can be considered a cheap and biodegradable biomass. The following tools were used to characterize the selected biosorbent: zero load point, Fourier-transform infrared spectroscopy (FTIR), and Scanning electron microscope (SEM). FTIR and SEM techniques were applied before and after the biosorption process in order to compare results and to understand the mechanisms involved in the removal of the metal by yerba mate leaves. Biosorption experiments were carried out in a batch system. Firstly, 25 mL of 25 mg/L Tl(I) solutions were prepared in Erlenmeyer flasks and the pH of each solution was adjusted to pH 4, 6 and 8. Then, different amounts of the biosorbent were added to the previous solutions. The flasks were stirred at room temperature and the solid phase was separated by centrifugation. For the optimization of the experimental variables, the response surface methodology was used via the application of a 3² factorial design. Under the optimal experimental conditions, a maximum biosorption capacity of 46.4 mg Tl/g of dried yerba mate and about 50% removal of the contaminant from aqueous solutions were obtained. Subsequently, a kinetic study was performed and the removal of the elemental species took place quickly, reaching the maximum response during the first 60 minutes of contact. Moreover, it demonstrated that leaves of yerba mate can be re-used as efficient alternatives for the biosorption of Tl(I) from aqueous solutions, promoting a sustainable decontamination process.

Palabras claves: thallium, biosorption, kinetic, *Ilex paraguariensis*.