16th RIO SYMPOSIUM ON ATOMIC SPECTROMETRY
Bento Gonçalves, Brazil
November 28th to 30th, 2023

071 - ECOFRIENDLY SOLID PHASE FOR THE PRECONCENTRATION OF LEAD PRIOR TO DETERMINATION BY ETAAS

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Lead is a highly toxic metal found naturally in the environment, although its greatest presence arises as result of human activities.[1] Its persistence in the environment facilitates transport of this element to rivers, lakes, streams, and may even contaminate water or food for human consumption. For this reason, the continuous monitoring of the metal in food is of fundamental interest. As lead concentrations in these matrices are generally very low (trace or ultratrace), very sensitive instrumental analytical techniques are required for its detection. However, even with techniques such as atomic absorption spectrometry with electrothermal atomization (ETAAS) or inductively coupled plasma mass spectrometry (ICP-MS), determination may not be feasible. In these cases, preconcentration based on the use of adsorbent materials is a very effective tool to increase the sensitivity of analytical methods, offering additional advantages such as simplicity and low consumption of organic solvents and other reagents.[2] In this context, the use of ecofriendly solid phases is welcome.

The objective of this work was to investigate the adsorption efficiency of a completely biodegradable hybrid material formed by bacteria and roots for the online preconcentration of lead. Initially, the biomaterial was prepared by mixing the components in an aqueous medium, under stirring for two hours at room temperature and finally drying in an oven. Then a lead solution was introduced using an online injection system to quantitatively retain the analyte on a microcolumn packed with the solid phase. The retained analyte was then desorbed with a flow of an acidic agent and finally it was determined by ETAAS. Under optimal experimental conditions, an analyte retention of 100% and an enrichment factor of 62 were achieved. The LOD for preconcentration of 5 mL of sample was 5.0 ng/L. The dynamic capacity of the hybrid adsorbent was 36 mg/g, which favoured the reuse of the column during more than five cycles cycles of adsorption-desorption. These results show that the proposed ecofriendly material is efficient for the preconcentration of lead from aqueous solutions and shows potential for its application in more complex matrices such as food.

1Gaur N, Kukreja A, Yadav M, Tiwari A, Appl. Water Sci. 98 (2018) 1-12.
2Ozdemir S, Kilinc E, Celik KS, Okumus V, Soylak M, Food Chem. 215 (2017) 447-453.

[PIBAA-1208 CONICET, M015-T1 UNCUYO]