

Project Review

INVESTIGATION ON ENVIRONMENTAL RADIONUCLIDE RETENTION ON HETERO-POLIOXO-METALLIC SORBENTS FOR RADIONUCLIDE ANALYSIS BY IONIC CHROMATOGRAPHY

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The present project is mainly aimed in developing a portable instrument for the analysis of radionuclide from the environment by using polioxo-metallic sorbents as suitable solid phase for the extraction procedure, with the purpose of pre-concentration and subsequent analysis of the retained radionuclide by ion chromatography.

The proposal intends through its main activities to contribute to the general efforts of radionuclide analysis from different environmental matrixes by accurate high-time resolution measurements. Concerted efforts in the present proposal will be made for analysis of radionuclide species which are not easily detected by gamma ray spectroscopy. Especially meant for investigation are those radionuclide responsible on beta ray emission (^{90}Sr , ^{99}Tc , and ^{63}Ni) and various trans-uranium compounds (^{232}Th , ^{235}U , ^{237}Np , ^{241}Am) for which an accurate quantification require high amount of human efforts for the implementation of accurate and appropriate extraction and concentration techniques. The innovative aspect of the proposal deals with the development of a high performant analytical methodology for the identification of various environmental radionuclide species.

The analytical methodology will be based on the development of a hyphenated technique combining both liquid chromatography and a selective alpha/beta counter operating in the scintillation mode.

The study is firstly based on laboratory investigation dealing with activities as synthesis of suitable active polioxometalic sorbents, physicochemical characterization of the synthesized sorbents.

Whenever the optimal parameters for the new analysis technique will be established the work is meant to be extended to field measurements on order to obtain qualitative and quantitative information on the contamination degree of natural samples with various radionuclide species.

Project activities:

This project focuses on the development of a technology for measuring transuranics and pure beta emitters through fast-time measurements (relatively quickly) with the potential of the technique being later on field deployable. The adopted technology is going to combine ion exchange liquid chromatography, ion chromatography and on-line alpha/beta discriminating scintillation counting to produce simultaneous alpha and beta chromatograms. The general goal of this project is to address the issues mentioned above, and in so doing transform an interesting laboratory technique of limited applicability into a robust field instrument suitable for environmental restoration and waste management applications.

The project includes the following objectives under its main tasks:

- Synthesis and physico-chemical characterization of sorbent material based on polyoxometals (POMs) namely: isopolymolybdate and heteropolytungstate.
- Investigation on retaining properties of the newly synthesized sorbent materials, isopolymolybdate and heteropolytungstate. Identification of chemical and radiological interferences in various samples.
- Development of an operational technique involving ion chromatography coupled with a counting flow-cell detector.
- Validation of the developed analytical method.

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