Ain Shams University Faculty of Science



CHEMICAL STUDIES ON POLYANILINE TITANOTUNGSTATE AS A NEW COMPOSITE CATION EXCHANGER AND ITS ANALYTICAL APPLICATIONS FOR REMOVAL OF CESIUM FROM AQUEOUS SOLUTIONS

A PhD Thesis Submitted

To

Chemistry Department Faculty of Science Ain Shams University

By

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M. Sc. (Inorganic Chemistry)
Department of Nuclear Fuel Technology
Hot Laboratories Center
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بشيب اللمالخ الرحب



صالله ذق العَظيم

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Chemical Studies on Polyaniline Titanotungstate as a New Composite Cation Exchanger and Its Analytical Applications for Removal of Cesium from Aqueous Solutions

List of Publications

- 1. I.M. El-Naggar, E.S. Zakaria, I.M. Ali, M. Khalil, M.F. El-Shahat, Kinetic modeling analysis for the removal of cesium ions from aqueous solutions using polyaniline titanotungstate, Arabian Journal of Chemistry (2012) 5, 109–119.
- **2.** I.M. El-Naggar, E.S. Zakaria, I.M. Ali, M. Khalil, M.F. El-Shahat, Chemical studies on polyaniline titanotungstate and its uses to reduction cesium from solutions and polluted milk, Journal of Environmental Radioactivity (2012) 112, 108-117.

Aim of Work

The latest developments of synthetic ion exchangers are the preparation and the application of inorganic-organic composite ion exchangers in order to obtain a combination of the advantages of inorganic and organic ion exchangers. These materials are used in analytical chemistry and in separation technology, because of their high selectivity's for metal ions and ease of preparation. Many inorganicorganic composite ion exchangers have been developed earlier by incorporation of organic polymers in the inorganic matrix. In order to increase interlayer distance of layered inorganic ion exchangers, to increase the selectivity's for the ions and to prepare larger particles with higher granular strength for column for the treatment of various aqueous solutions and radioactive waste from cesium. This may open new possibilities for their industrial applications. In this concern, efforts have been made to study and develop effective and economic materials for treatment cesium ion from aqueous solutions waste using polyaniline titanotungstate. The following items will be studied:

- Synthesis of polyaniline titanotungestate.
- Characterization of the prepared material using IR, XRD, SEM and DTA-TGA analysis.
- Chemical stability, equilibrium studies and capacities of the prepared material for Cs⁺ at different operation conditions.
- Determination of the diffusion mechanisms and selectivity of these materials.
- Ion exchange isotherms.
- Separation of Cs⁺ from other ions.