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Studies on Sodium lauryl sulphate supported Thorium (IV) phosphate: A New Surfactant supported Cation exchange resin, Useful in Water Purification

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Abstract

Background: With increasing population and decreased quality of drinking water, there is a great demand for the development of new materials and methods that can find applications in the purification of water. This paper presents our small effort from pollution to solution by presenting the synthesis method of new sodium lauryl sulphate supported thorium (IV) phosphate, its characterization, and disquisition of analytical applications by executing some dual separations of calcium.

Methods: Sodium lauryl sulphate thorium (IV) phosphate was synthesized by sol gel method. The synthesized exchanger was characterized by some physico-chemical studies like powdered X-ray diffraction, Scanning electron microscopy, Thermo gravimetric-differential thermal analysis, EDAX and Fourier transform-infrared study and was also checked for its competency towards the ion exchange processes and in analytical chemistry.

Results: The prominent characteristic of Sodium lauryl sulphate supported Thorium (IV) phosphate has been its tremendously high ion exchange capacity for sodium ions (3.10 meq/g) which is almost two and half times more than the exchange capacity of Thorium (IV) phosphate (ThP), i.e., 1.3 meq/g. The material was resulted in fibrous sheet which is quite thermally, mechanically stable and poorly crystalline. The material has shown selectivity towards $Ca2^{+}$ and $Hg2^{+}$ ions.

Conclusion: The synthesized cation exchange material has been found quite thermally stable, showing drastically high exchange capacity and selectivity towards $Hg2^{+}$ and $Ca2^{+}$ metal ions which might be because of the use of an anionic surfactant, sodium lauryl sulphate while synthesis of Th (IV) phosphate which has played a key role in enhancing the exchange capacity and adsorption of specific metals as well. Therefore, based on the results obtained, the above said materials can find applications in water purification processes and also, in environmental pollution control where removal of $Hg2^{+}$ and Ca2+ is required.

Keywords:

Sodium lauryl sulphate, Surfactant, Surfactant supported cation exchanger, Thorium(IV) phosphate, Water purification, Water treatment

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