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Synthesis, characterization and ion exchange characteristics of a novel hybrid ion exchange material

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ABSTRACT

In the present study, zirconium diethylene triamine pentamethylene phosphonate (ZrDETPMP), a hybrid ion exchanger of the class of tetravalent metal acid (TMA) salt, has been synthesized by soft chemistry route, sol-gel method. The material was characterized for elemental analysis (ICP-OES and CHN analyzer), thermal analysis (TGA), spectral analysis (FT-IR), X-ray diffraction and SEM. Chemical resistivity of the material was assessed in various media (acids, bases and organic solvents). Ion exchange capacity was determined and the effect of calcination on ion exchange capacity (IEC) was studied. The distribution behaviour (K_d) in different electrolyte media/concentrations, breakthrough capacity and elution behaviour of metal ions La^{3+}, Ce^{3+}, Pr^{3+}, Nd^{3+}, Sm^{3+} and Th^{4+} were studied and discussed.

Keywords: Tetravalent metal acid salt; Metal phosphonate; Zirconium phosphonate; Hybrid ion exchanger

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