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Synthesis, characterization and application of cerium phosphate as an ion exchanger

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ABSTRACT

In the present endeavour, cerium phosphate (CP), an ion exchanger of the class of tetravalent metal acid (TMA) salt has been synthesized by soft chemistry route, sol gel method. Physical and ion exchange characteristics as well as chemical stability of the material in various acids, bases and organic solvent media has been studied. CP has been characterized using instrumental methods (FTIR, TGA/DSC, XRD and SEM). Distribution coefficient (K_d) of metal ions Mn^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+}, Cd^{2+}, Hg^{2+} and Pb^{2+} has been determined in aqueous as well as various electrolyte media/concentrations. The equilibrium exchange (varying temperature) of these metal ions with H^+ ions contained in CP has been studied and thermodynamic parameters equilibrium constant (K), standard Gibbs free energy ($\Delta G°$), enthalpy ($\Delta H°$) and entropy ($\Delta S°$) have been evaluated.

Keywords: Tetravalent metal acid salt; Inorganic ion exchanger; Cerium phosphate; Distribution coefficient (K_d); Thermodynamics of ion exchange; Cation exchanger

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