Sorption of Europium by Methylene Phosphonic Acid Grafted Covalently on Polystyrene Resin

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A new chelating polymeric sorbent has been developed using polystyrene resin grafted with methylene phosphonic acid. After characterization by FTIR and elementary analysis, the new resin has been investigated in liquid–solid extraction of europium(III). The results indicated that phosphonic resin could adsorb Eu(III) ion effectively from aqueous solution. The adsorption was strongly dependent on pH of the medium with enhanced adsorption as the pH value of 6.5. The influence of other analytical parameters including contact time, amount of resin, metal ion concentration, and ionic strength were investigated. The maximum uptake capacity of Eu(III) ions was 122.6 mg/g grafted resin at 25 ± 2 °C, at an initial pH value of 6.50. The overall adsorption process was best described by Lagergren-first-order kinetics. When Freundlich and Langmuir isotherms were tested, the latter had a better fit with the experimental data. Furthermore, Eu(III) could be eluted by using 1.0 mol/L H\textsubscript{2}SO\textsubscript{4} solution and the grafted resin could be regenerated and reused.