Specific Sorbents For Cadmium Detoxification

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Although it has been suspected since ancient times that metals participate in biological processes, details of their functions have until recently remained unknown. It is well known that metals play roles in catalysis, hormone action, gene and other regulatory functions, structural stabilization of macromolecules, muscle contraction, nerve conduction and transport. Therefore, excess heavy metal ions, such as Cd²⁺ and Hg²⁺, introduced into the body can replace the native ions (especially Zn²⁺) from many proteins and enzymes preventing their above mentioned functions, in other words causing toxicity.

The aim of this study is to develop specific sorbents for the removal of cadmium from the blood of the patients with cadmium toxicity. For this purpose, poly(EGDMA/HEMA) copolymer microspheres are used as the carrier matrix of the sorbent. Microspheres are produced by suspension polymerization of the monomers ethylene glycol dimethacrylate (EGDMA) and hydroxyethyl methacrylate (HEMA) in an aqueous medium. Cibacron blue, which forms chelate with Cd(II) ions are then immobilized on these microspheres. The elementary experiments are carried out in aqueous solutions of Cd(II) ions and the following results are obtained:

- The absorptivity or the binding capacity, φ, of the immobilized sorbent is dependent on pH and the maximum binding capacity is found to be 20 mg Cd²⁺/g immobilized sorbent at pH 7.3.
- All of the metal ions could be desorbed at pH<1 where the binding capacity is minimum.
- The time required to reach the equilibrium is found to be about 1 hour.
- The binding capacity is found to be independent of temperature.