PREPARATION OF Fe(III) ATTACHED POLY(ALGINATE-CHITOSAN) MICROPARTICLES FOR FERRITIN ADSORPTION

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Many transition metals can form stable complexes with electron-rich compounds and may coordinate molecules containing O, N and S by ion-dipole interactions. Metal ions and ligands are first-row transition metals (Zn$^{2+}$, Ni$^{2+}$, Cu$^{2+}$, and Fe$^{3+}$) in combination with iminodiacetic acid, nitrilotriacetic acid, tris(carboxymethyl)ethylene-diamine. IMAC introduces a new approach for selectively interacting materials on the basis of their affinities for chelated metal ions. The separation is based on the interaction of a Lewis acid (electron pair donor), i.e. a chelated metal ion, with an electron acceptor group on the surface of the protein. Proteins are assumed to interact mainly through the imidazole group of histidine and, to a lesser extent, the indoyl group of tryptophan and the thiol group of cysteine. Co-operation between neighboring amino acid side chains and local conformations plays an important role in protein binding. Aromatic amino acids and the amino-terminus of the peptides also have some contributions. The low cost of metals and the reuse of adsorbents for hundreds of times without any detectable loss of metal-chelating properties are the attractive features of metal affinity separation. Poly-(Alginate-Chitosan) microstructures [Poly(Alg-Ch)] were prepared by the cation induced controlled gelification of alginate with slight modifications. Then, Fe$^{3+}$ ions were chelated directly on the microparticles. Poly(Alg-Ch) microparticles were characterized by FTIR, SEM, and swelling studies. Fe$^{3+}$ chelated microparticles were used in the adsorption of ferritin from aqueous solutions. Ferritin adsorption increased with increasing ferritin concentration. Non-specific ferritin adsorption was negligible. Adsorption behaviour of ferritin could be modelled using both the Langmuir and Freundlich isotherms. Adsorption capacity decreased with increasing ionic strength of the binding buffer. Ferritin molecules could be adsorbed and desorbed five times with these adsorbents without noticeable loss in their ferritin adsorption capacity.