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Thematic course: Protein-polyelectrolyte complexes. Part 3.

Complexes bovine serum albumin with sulfonate-containing aromatic poly- and copolyamides

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Abstract

The interaction of bovine serum albumin in aqueous solution with sulfonate-containing poly- and copolyamides were studied. It was shown that, as a result of macromolecular reactions protein-polyelectrolyte complexes forms, stabilized mainly by electrostatic forces. To characterize the protein-polyelectrolyte complexes composition the r parameter used, which is defines as the ratio of mass concentration of polyelectrolyte and protein. It was shown that the main factor determining the composition and structure of forming protein-polyelectrolyte complexes is the degree of ionization of functional groups, interacting in the polyelectrolyte reaction that is determined by the nature of those groups and the pH of the solution. The presen ce of sulfonate and carboxylic groups in the copolyamide composition gives an extra opportunity to regulate the protein-polyelectrolyte interactions. Using spectrophotometry were established that, in the studied system when the aromatic polyamide and bovine serum albumin are mixed at optimal pH conditions (pH < 4.9), complexes are formed, the composition of which corresponds to the value of r ~ 0.15 g/g. The degree of conversation in protein-polyelectrolyte reactions is close to 0.8. The size of the formed particles was about 2.2 μm. In the case of aromatic copolyamides that contain both sulfonate and carboxylic groups, an increase in concentration of carboxylic groups to 42 mol. % leads to a shift of the optical density maximum on the curve of turbidimetric titration in to the higher r values (~ 0.18 g/g) at pH = 3.5, when the carboxylic groups are non-ionized. The size of the formed complex particles was about ~ 150.0 nm, the fraction of micron-sized particles is about 5%. The degree of released protein is based on the conditions under which reaction take place and varies from 93 to 99%. The result obtained during this work can serve as a base for the effective methods of isolation and purifying of the target proteins development.

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