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*Thematic course:* Protein-polyelectrolyte complexes. Part 1.

# Complexes bovine serum albumin with carboxymethylcellulose. Influence factor the flocculation of protein

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**Abstract**

The interaction of bovine serum albumin in aqueous solution with sodium salt of carboxymethyl-cellulose was studied. It is shown that, protein-polyelectrolyte complexes (PPC) forms because of macromolecular reactions, which are stabilized mainly by electrostatic forces. To characterize the PPC composition the φ parameter used, which is defines as the ratio of concentration of ionic groups of polyelectrolyte per mole of protein molecules. Using spectrophotometry is was established that, in the studied system when components are mixed under optimal conditions (ratio of components, pH of the solution) complexes are formed, the composition of which corresponds to φ ~60 ([carboxymethylcellulose (CMC)]/[bovine serum albumin] = 0.2-0.25 g/g). The degree of conversation in reactions of protein with polyelectrolyte is close to 0.9. It is shown that a reaction of PPC production is highly sensitive to the conditions under which it take place, especially to the concentration and to the rate of components being mixed. An increase in the mixing rate of the components leads to a shift of the maximum of the optical density on the curve of turbidmetric titration of protein solution to an area of lower φ value. In a protein-polyelectrolyte system there are larger particles: their average size increases from 0.97 μm ($v$ = 10 μl/min) to 2.76 μ m ($v$ = 100 μl/min). When a concentration of CMC lowers in the solution from 1 g/dm$^3$ it was not accompanied by a significant change in the average size of PPC particles (~1 μm). However, when a concentration of polyelectrolyte in a solution is significally lowered there is a decrease in the yield of insoluble PPC. The degree of protein being released based on the conditions under which interpolyelectrolyte reaction is 63.3-99.7%. The increase in the ion strength of the solutions leads to destruction of insoluble PPC, which promotes the regeneration of protein. The result obtained during this work can serve as bases to develop the effective methods of isolation and purifying of the target proteins.

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