HYDROPHILIC STIMUL-SENSITIVE POLYMERS ON THE BASE OF GLYCOLIC ACID AND THEIR HYDROGELS

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In last years essential interest is devoted to stimul-sensitive polymers. Under this name watersoluble and waterswelling polymers were united. Most of them can be used in medicine, biotechnology, ecology, agriculture and other fields owing their possibility to react on changes of pH, ionic strength, temperature and presence of some compounds [1]. At the functionation of such high molecular compounds a phase transition sharp swallowing or pressing under action of changes of the medium properties have occurred. Chemical structure of functional groups of macromolecules, their hydrophobic balance and structure of polymeric chain have very important significance in display of such properties.

In this work watersoluble and waterswelling polymers on the base of glycolic acid were obtained. Watersoluble polymers were synthesized by radical polymerization of acryloiglycolic acid (AGA) and methacryloiglycolic acid (MAGA), but waterswelling polymers were obtained by copolymerization of AGA and MAGA with N,N’-methylene-bis-acrylamide (MBA) and N,N’-hexamethyleneacrylamide (HMDA). Investigation have shown that watersoluble polymers were a typical polyelectrolytes, viscosity of their solutions depended on pH and ionic strength. Hydrogels of crosslinking polymers of AGA and MAGA have shown pH-sensitive properties. By this reason stimul-sensitive properties of crosslinking polymers of AGA and MAGA were characterized by investigation their equilibrium swelling in water solutions at different values of pH, ionic strength and temperature. It was determined that swelling of obtained hydrogels in water depended on content of crosslinking agent in polymer and it’s nature. At the same content of the crosslinking agent polymers of acryl acid swellowed in more degree than polymers of AGA. Gels obtained by radical polymerization AGA under action of K2S2O8 have the largest swelling. Swelling of the obtained hydrogels depended on pH and has a maximum value at pH=9.

Decreasing of pH and increasing of ionic strength caused to sharp decreasing of degree of equilibrium swelling in water of hydrogels owing to decreasing ionization degree of carboxylic group in macromolecules and strength of attraction, caused by hydrophobic interactions and hydrogel bonds begin to prevail over strengths of repulsion of the same charged ions. In the result of this water has became a thermodynamically “bad” solvent and system has push out it from itself.

Stimul-sensitive properties of investigated systems visual can be demonstrated at study by these systems sorbtion of cationic dye-methilenic-dark blue. Desorbition of this due has depended on pH. The dye sorbited in neutral medium, completely desorbited in basic medium, where swelling of polymer was significant, and didn’t desorbited in acid medium, where hydrogel macromolecules were curtailed state and swelling of polymer was insignificant.

References
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