RADIATION SYNTHESIS AND CHARACTERIZATION OF COPOLYMERIC HYDROGELS ON BASIS OF POLYETHYLENE GLYCOL AND METHACRYLIC ACID

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In the present work copolymeric hydrogels of PEG (molecular weight 2000, 10000 and 20000) and MAA with weight ratio 25:75, 34:66 and 50:50 were synthesized by $\gamma$-irradiation polymerization in $^{60}$Co-Gammacell 220 in water-ethanol solution with addition of TEGDMA as cross-linking agent and characterized. For hydrogels with smallest PEG molecular weight the minimum gelation was observed which probably is attributed to reducing of formation of hydrogen bonds between PEG and PMAA groups, which can be additional cross-links in network structure.

The highest swelling degree in water was observed for the samples with molecular weight of PEG 2000 and lowest for hydrogels with PEG 20000. Probably it is due to the formation of stronger interpolymer complexes between carboxylic groups PMAA and ether oxygen of PEG. Study of influence of pH onto the swelling degree of obtained hydrogels showed that samples undergo sharp contraction in pH region from 4.5 to 5.5 that relates to formation of strong interpolymer complexes through hydrogen bonds between PMAA and PEG.

Effect of pH on network structure of obtained hydrogels was studied with using mechanical test equipment. Increasing of elastic modulus and significant decreasing of effective cross-link density and average molecular weight between cross-links with decreasing of pH was observed what could be attributed to the presence of additional physical cross-links resulting from interpolymer complexation in the networks.

Thus, copolymeric hydrogels on basis of PEG and MAA were synthesized by $\gamma$-irradiation. The optimal conditions of hydrogels synthesis were determined. Influence of PEG molecular weight and pH on swelling degree of samples were estimated. Also mechanical tests of PEG-MAA hydrogels for determination of changing in network structure in solutions with different pH were carried out.