

STUDY OF AN ACTIVE SUBSTANCE RELEASE FROM HYDROGEL POLYMER NANOCOMPOSITES

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Hydrogel polymer nanocomposites are a new group of materials with wide application possibilities. These hybrid materials are composed of polymer matrix, in which nanofiller particles are dispersed. The nanofiller presence in the polymer matrix can significantly change the mechanical and swelling properties of the system [1, 2].

In our studies, the layered structured montmorillonite (Cloisite®30B) nanoparticles were dispersed in polyurethane matrix.

The aim of the study was to investigate the transport mechanism of the active substance (paracetamol) in a hydrogel polymer nanocomposite matrix with different concentration of Cloisite®30B nanoparticles, based on swelling and release measurements using gravimetric and UV-Vis techniques, respectively. Analysis of the swelling and release curves allowed to determine the diffusion mechanism in studied systems using known theoretical models [3].

The swelling measurements were done for samples containing 0%, 0.5% and 1% wt. of nanofiller in 1% concentration of paracetamol in ethanol solution in water. These studies have shown that transport of the active substance strongly depends on the amount of nanofiller. When concentration of nanofiller increases, value of swelling parameter also increases.

In case of release studies, the highest absorbance values for the paracetamol molecules have been observed for the solution with pure matrix. The lowest absorbances were registered for the matrix containing 1% Cloisite 30® B. These results show that, as concentration of nanofiller increases, the barrier effect for paracetamol molecules is stronger.

The results of release and swelling measurements allow to conclude that hydrogel nanocomposite PU/PEG 4000 with 1% concentration of nanofiller can be used as sustained release drug delivery wound dressing.

REFERENCES

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