GEL-LIKE FORMS OF DRUGS ON THE BASIS OF SOLUTIONS OF SUCCINAMIDE OF CHITOSAN WITH GLYCEROL

Bazunova A. A.
Bashkir State University
mbazunova@mail.ru

A very serious problem is creation of gels for medical purposes with a given set of properties based on naturally occurring polymers such as chitosan and its derivatives, which have biocompatibility and absence of toxicity. Polymeric gels may be used as transport forms of drugs for wound healing coating and implantable prosthetic devices.

Elastic and plastic (rheological) properties such as viscosity, yield stress, viscous modulus, elasticity modulus, and thixotropy show a number of indicators and quantitative parameters characterizing the processes associated with the production and use of polymer gels. In case of development of polymeric dosage forms, rheological parameters affect the indicators such as ease of use and dosing.

We chose the approach to the creation of viscoelastic systems based on succinamide of chitosan (SHTZ) without crosslinking agents, comprising the formation of an additional network of physical links by introducing a low molecular weight modifier – glycerol. The selection of these data modifiers for the regulation processes of gelation of SHTZ solutions is due to the fact that glycerol is capable of forming intermolecular hydrogen bonds with macromolecules of polysaccharides.

We studied rheological behavior of the solutions of SHTZ in the mixture of water-glycerol of various volumetric ratios and found out the following results. The addition of glycerol in SHTZ–water is accompanied with a significant increase in viscosity almost in the entire range of studied polymer concentrations. Formation of mesh links in the presence of glycerol begins significantly at lower concentrations of SHTZ than in the case of aqueous polymer solutions. For example, when we take glycerin (20 % v.) we observe a significant increase of the dynamic viscosity with 4.0 wt % SHTZ concentration compared to the viscosity of aqueous polymer solutions, but if we take glycerin (30 % v.) we get the same result with 3.0 wt % SHTZ concentration.

With 3.0 wt % SHTZ concentrations at ratios of water : glycerol (v/v) 70:30, the elastic modulus of the studied systems is greater than the viscosity modulus and the systems become elastic and viscous.

Thus, the structure of SHTZ in the solution is accompanied by the formation of an additional network of physical links, nodes which aggregate SHTZ macromolecules formed in a mixed solvent of water–glycerol. It promotes earlier formation of viscoelastic properties that ultimately leads to the gelation at lower polymer concentrations than in the case of SHTZ solutions without giycerol addition. The resulted gelled systems possess a good biocompatibility with hematological indicators, and therefore they can be used as polymeric forms of drugs.