

# INTERPOLYMER COMPLEXES ON THE BASIS OF SODIUM CARBOXYMETHYL CELLULOSE - CARRIERS NANOPARTICLES OF MEDICINAL PREPARATIONS

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The interpolymer complex (IPC) as the basis for the creation of nano-drugs based on natural polyelectrolytes Na-CMC was obtained. The structure and physicochemical properties of IPC based on Na-CMC with UFOs of various structures were studied. As a result, IPCs with a different content of the triazinone cycle were obtained, which have a globular structure with different diameters (from 200– 500 Å), mechanical strength (from 80 MPa – 140 MPa), elastic modulus (from 3 10<sup>3</sup> MPa – 3,8 10<sup>3</sup> MPa. It was ascertained that IPC based on Na-CMC and UFOs with enhanced strength properties can be obtained from solutions of components taken at an equimolar ratio and at pH = 2.0–3.0.

**Key words:** polyelectrolyte, sodium carboxymethylcellulose, urea formaldehyde oligomer interpolymer complex, structure, properties.

**Topicality:** In recent years, researchers have increasingly attracted the creation of nano-medicinal preparations based on nano-particles, which will be delivered by the bloodstream directly to the diseased human organ, which will increase the effectiveness of its use and reduce side effects. In this regard, the preparation of effective nano-drugs is relevant.

Intensive research works are being conducted on the study, development of IPC technology at the University of California (USA), Oxford University (England), Tokyo University (Japan), and Moscow State University named after Lomonosov (Russia).

The analysis of international literature data indicates an intensification of research on the development of compositions based on interpolymer complexes, which allows us to significantly expand the range of polymeric carriers with physicochemical and structural features as compared to those used in pharmaceutical practice.

**Materials and methods of research:** In connection with the above the purpose of this work is the study on the synthesis of new carriers of medicinal substances of gel and ointment forms obtained on the basis of sodium carboxymethylcellulose (Na-CMC) and urea-formaldehyde oligomer (UFO) with prolonged actions.

IPC solutions were obtained by mixing aqueous solutions of the components of Na-CMC and UFO in equinormal ratios at different contents of components and pH of the medium. The solutions were poured onto an optical glass substrate and evaporated at room temperature. The structure of the products obtained was ascertained using IR spectroscopy and electron microscopy. IR spectra in the range of 400–4000 cm<sup>-1</sup> were recorded on “NIKOLET Magna-560” IR spectrophotometers. Mechanical properties of IPC films were studied by the method of stretching.

**Results and discussion:** An interpolymer complex was obtained as the basis for the creation of nano-drugs based on natural polyelectrolytes (Na-CMC). The structure and physicochemical properties of IPC based on Na-CMC with UFOs of various structures were studied. As a result, IPC with a different content of the triazinone cycle was obtained, which have a globular structure with different diameters (from 200 to 500 Å), mechanical strength (from 80 MPa to 140 MPa), elastic modulus (from 3 10<sup>3</sup> MPa to 3 , 8 10<sup>3</sup> MPa) as well as the viscosity of solutions having a value in the range from 0.16 Pa s to 0.20 Pa s. It has been ascertained that IPC based on Na-CMC and UFOs with enhanced strength properties can be

obtained from solutions of components taken at an equimolar ratio and at  $\text{pH} = 2.0\text{--}3.0$ . By changing the structure of the interacting components, it is possible to substantially control the structure and properties of the IPC based on Na-CMC and UFOs. The regulation of the physicochemical properties of PC films opens up wide possibilities for their use as a basis for soft dosage forms in pharmacy for the preparation of nano-drugs.

Production and use of such nano-sized finished dosage forms (liposomal forms (sizes 20–50 nm), biodegradable polymers (sizes 3–300 nm), nanoparticles (sizes up to 100 nm) for directional transport, etc.), as well as the use of targeted innovative drugs (targeted drugs - these are drugs that act only on the tumor, not poisoning the body, sizes 1-10 nm), providing nanoscale effects on the biological target, which leads to a therapeutic effect.

Based on complex physicochemical, physicochemical, technological, and biopharmaceutical studies, the prospects for using the polycomplex gel base as a carrier for medicinal nanoparticles have been shown, and the technology to produce gels with predetermined physicochemical and technological properties has been developed.

**Conclusion:** Thus, on the basis of complex physicochemical, physico-mechanical, technological and biopharmaceutical studies, the prospects for using interpolymer complexes based on polysaccharide sodium carboxymethylcellulose as carriers of nanoparticles in pharmaceutical preparations have been shown.