# CAPSULATION OF NANOPARTICLES OF ARTICHOKE PRICKLY WITH POLYSACCHARIDE SODIUM CARBOMYMETHYL CELLULOSE AND THEIR RESEARCH

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**Topicality:** In the pharmaceutical industry, the use of nanoparticles to deliver a drug to a diseased organ is considered promising. For this, the drug molecules, i.e. nanoparticles are grafted to the carrier. As a result of modification, the nanoparticles become soluble in the blood and able to penetrate cell membranes. This facilitates the process of delivery of drug nanoparticles to the “target” - to the affected cells that require treatment. In addition, in the development of modern nanotechnology a significant role is played by studies of nanoparticles obtained from extracts of medicinal plants with the help of solutions of metal salts. This is due to the wide range of possibilities for their practical application, in which the specific properties of both the nanoparticles obtained from the extracts of medicinal plants and the materials modified by them are used [1,2].

In connection with the foregoing, this work is devoted to obtaining nanoparticles and studying the physicochemical properties, stability of encapsulated nanoparticles obtained from the medicinal plant of artichoke prickly - "Cynara scolymus L.".

**Objectives:** In this regard, the study of "Cynara scolymus L." and the possibility of obtaining nanoparticles and the preparation of drugs based on them is an urgent problem for pharmaceutical science and practice. At the same time, it should be noted that in some European and other countries of the world, over the last 10–15 years, researchers have begun to deal with nanoparticles and the creation of nano-drugs based on them. However, in this area in Uzbekistan they are just beginning to be engaged, although it has a great future in the field of pharmaceuticals and medicine [1,2].

**Materials and methods of research:** To obtain nanoparticles from Cynara scolymus L., an extract was prepared from artichoke prickly leaves, which were grown at the experimental site of the Tashkent Pharmaceutical Institute and at the experimental station of the Tashkent State Agrarian University. Fresh leaves of Cynara scolymus L. were collected in 100 g each, after which they were cleaned and crushed with a scissors to a size of d = 2-3 mm. From the leaves of Cynara scolymus L., an extract was prepared with 70% ethyl alcohol in the ratio of Cynara scolymus L.: ethyl alcohol = 1:10 Extraction cannot be performed with pure alcohol, because it can remove undesirable substances and only partially dissolve the necessary solvent. Tightly closed with a lid and stored for 16 days in a thermostat at a temperature of 22-24 °C. Vials were shaken periodically with a SHR-2D laboratory shaker. From the extracts, nanoparticles were obtained by precipitation with salts of $MgSO_4$.

**Results and discussion:** In the obtained extracts from artichoke prickly, aggregation occurs over time. The natural polysaccharide sodium carboxymethylcellulose (Na-CMC) can be used to enhance aggregative stability. The introduction of Na-CMC significantly prevents aggregation and reduces the average size of nanoparticles. By mixing the solution of nanoparticles of artichoke prickly extract with solutions of Na-CMC in various volume ratios, a nanocomposite was obtained in which nanoparticles are stabilized by the polysaccharide Na-CMC. Let us briefly summarize the results of the study of the physicochemical properties of the synthesized nanocomposites (table). As well as increasing the concentration of magnesium sulfate salts, an increase in the size of nanoparticles is observed.

**Table**

**Physico-chemical properties of nanoparticles from artichoke prickly extract - "Cynara scolymus L." encapsulated with sodium carboxymethylcellulose**

| Compo-sition and Properties | Na-CMC | Na-CMC : Extract "Cynara scolymus L." | | | | Extract "Cynara scolymus L." |
|---|---|---|---|---|---|---|
| | | 80:20 | 60:40 | 40:60 | 20:80 | |
| Appearance | White-yellow liquid with a peculiar odor | Dark green liquid with a peculiar smell | Light green liquid with a peculiar smell | Light green liquid with a peculiar smell | Light brown liquid with a peculiar odor | Brown liquid with a different odor |
| pH value (1:10) | 7,2 | 7,0 | 6,48 | 6,30 | 6,52 | 6,70 |
| Solution viscosity **η**, Pa·s | 0,075 | $55{,}4 \cdot 10^{-6}$ | $27{,}7 \cdot 10^{-6}$ | $3{,}5 \cdot 10^{-6}$ | $3{,}2 \cdot 10^{-6}$ | $15{,}10 \cdot 10^{-6}$ |

**Conclusions:** Thus, the nanoparticles were synthesized from the extract of the medicinal plant Cynara scolymus L. with the introduction of magnesium sulfate salts. By varying the concentration of the polysaccharide Na-CMC, we obtained aggregatively stable nanocomposites.

**References:**

1. Yegorova E.M. Nanoparticles of metals in solutions: biochemical synthesis and application. // Nanotechnology. 2004. №1. P.15-26.

2. Gusev A.I. Nanomaterials, nanostructures, nanotechnologies. M.: Fizmatlit, 2005. P.416.