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Importance of Supramolecular Complexes of Glycyrrhizic Acid and Salts in Pharmaceuticals

Mukhtarov Odil Pozilovich
Senior researcher of the Institute of Nuclear Physics, Fiz-mat.f.d.

Turgunova Sabakhat Ilkhomjon kizi
Graduate student of the Faculty of Chemistry, National University of Uzbekistan, In the name of Mirzo Ulugbek

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ABSTRACT

Currently, in the creation of effective drugs, it is important to increase the solubility of the drugs, their stability to the environment in which the drug is transported, oxidation processes, and to be able to control the release of the drug from the drug form. Molecular encapsulation technology of the main active drug substance is one of the modern methods for increasing the effectiveness of difficult-to-dissolve, highly toxic pharmacons. The essence of the technology is that the molecule of the drug is placed on the surface of the complex-forming substance molecule. This technology is applied to drugs that are poorly soluble in water, highly toxic, low in bioactivity, and used in high doses. Complex drugs have a number of advantages, showing high solubility and dissolution rate, high bio-reactivity, through which a rapid therapeutic effect is achieved, and a decrease in negative side effects is observed, they are protected from premature destruction under the influence of metabolic processes in the body, and the possibility of transport in the body is increased.

Creation of ecologically safe food products in the world is one of the urgent issues before science. But today, due to the widespread use of preparations with different chemical structures in order to increase the productivity of agricultural plants, negative conditions are observed in the indicators of crop quality. Accordingly, it is important to use ecologically safe natural compounds in managing the growth and development of plants grown for the purpose of creating food products.

In many research centers of Dunè, special attention is paid to determining the mechanism of action of natural physiological active substances in order to increase the quality of the crop of plants. Increasing the level of resistance of plants to adverse environmental factors, including salinity, is one of the important issues in agriculture. In this case, the prospects of using phytohormones, which perform the function of mediators of external signals in plant tissue cells, are highly appreciated.. Under the influence of phytohormones, the level of stability and functional activity of the biological membrane of the plant cell increases, the level of resistance of the plant to stress-factor effects increases by regulating the activity of metabolic processes in the cell. In our country today, special attention is paid to the implementation of scientific and innovative achievements in the cultivation of ecologically safe plant products. In the Strategy of Actions for further development of the Republic of Uzbekistan, 10 separate tasks are defined on "Stimulation of research and innovation activities, creation of effective mechanisms for implementation of scientific and innovation achievements". From this point of view, special

attention was paid to the creation of supramolecular complexes based on various compounds and their use in obtaining ecologically safe products from agricultural plants. Accordingly, glycyrrhizic acid (GK) is considered to be the most important natural physiologically active substance and one of the promising agents.

Supramolecular chemistry, which is one of the four directions of chemistry, began to develop in the 60s and 70s of the last century with the chemistry of macromolecular ligands of metal cations. The term "Supramolecular chemistry" and its basic concepts were introduced to science by the French Scientist J.-M. Len. He said that there is a field of molecular chemistry based on covalent bonds and a field of supramolecular chemistry based on molecular ensembles and intermolecular bonds.Later he changed the definition to ``Supramolecular chemistry", which studies the structure and function of the association of two or more chemical particles held together by intermolecular forces. J.-M. Len divides supramolecular chemistry into two broad areas:

- Supermolecules are oligomolecular particles that are built on the basis of the principle of intermolecular recognition and have a clear boundary, which are formed as a result of the intermolecular association of several components (receptor and its substrates);
- Molecular ensembles are polymolecular systems formed as a result of the spontaneous association of several (unknown exact number) components and passing into a specific phase with a more clearly defined microscopic structure, and their characteristics depend on the nature (for example, clathrates, membranes, vesicles, micelles).

Today, many studies are focused on the development of methods for the synthesis of self-organized large and small molecular systems (complexes). Organization in these systems occurs in most cases not due to covalent bonds, but with the participation of various effects (for example, due to hydrogen bonds). In some cases, covalent bonding is a major part of this process (for example, metal-ligand interaction). Such a change of views is not new, but the development of the concept of guest-host in the science of kimè and the inclusion of concepts in other areas of natural sciences.

Currently, in the creation of effective drugs, it is important to increase the solubility of drugs, the stability of the drug to the environment in which the drug is transported, to oxidation processes, and to be able to control the release of the drug from the drug formMolecular encapsulation technology of the main active drug substance is one of the modern methods for increasing the effectiveness of difficult-to-dissolve, highly toxic pharmacons. The essence of the technology is that the molecule of the drug is placed on the surface of the complex-forming substance molecule. This technology is applied to drugs that are poorly soluble in water, highly toxic, low in bioactivity, and used in high doses. Complex drugs have a number of advantages, showing high solubility and dissolution rate, high bio-reactivity, through which a rapid therapeutic effect is achieved, and a decrease in negative side effects is observed, they are protected from premature destruction under the influence of metabolic processes in the body, and the possibility of transport in the body is increased. Ring oligosaccharides (cyclodextrins) and their derivatives, crown ethers, cryptand, cyclophane, and polyvinylpyrrolidone are widely used for molecular encapsulation of biologically active substances. In recent years, studies have been conducted on obtaining supramolecular complexes of drugs based on the main component of licorice root - GK and its derivatives. Russian scientists (G.A. Tolstikov and others) have shown that the pharmacological activity of drugs is manifested in very low doses (up to 100 times) in complexes. In addition, in a number of cases, other beneficial pharmacological properties of the drugs were enhanced. They found that the maximum effective effect of drugs in complexes with GK is manifested in the ratio of GK: drug = 4:1 and even 8:1.

Thus, when supramolecular complexes of drugs are obtained through molecular encapsulation, the drug becomes water-soluble, its effective dose, toxicity decreases, and the width of the therapeutic index increases several times.

This indicates that this method is a promising direction in the creation of effective drugs. We also tried to obtain complexes of FOBs, which showed effective inhibitory activity in our studies, in order to reduce the toxicity and exposure dose. Since glyceric acid and its salts are surface-active substances, have the property of forming micelles and solubilization in solutions, we will try to analyze the researches conducted on the physical-chemical study of its solutions.

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