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STUDY OF THE BIOLOGICAL ACTIVITY OF THE SUPRAMOLECULAR COMPLEX OF THE AMMONIUM SALT OF GLYCYRRHIZIN ACID WITH GALLIC ACID IN THE RATIO OF 1:2, 1:4

Abstract: Synthesis of biologically active substances acting in a certain direction and their modification is one of the most important research fields of modern bioorganic chemistry on a global scale. Natural compounds extracted from plants have a high biological activity and have several advantages compared to synthetic compounds with fewer side effects, compatibility with the living organism, and their specific properties.

Key words: glycyrrhizic acid, mannoammonium salt, biological activity, supramolecular, supramolecular, Results and analysis, substances.

Аннотация: Синтез биологически активных веществ, действующих в определенном направлении, и их модификация являются одним из важнейших направлений исследований современной биоорганической химии в мировом масштабе. Природные соединения, выделенные из растений, обладают высокой биологической активностью и имеют ряд преимуществ по сравнению с синтетическими соединениями: меньше побочных эффектов, совместимость с живым организмом, специфические свойства.

Ключевые слова: глицирризиновая кислота, манноаммонийная соль, биологическая активность, надмолекулярный, супрамолекулярный, Результаты и анализ, вещества.

Grounding of relevant scientific solutions for creation of highly effective, biologically active stimulants obtained on the basis of plant raw materials in many large research centers in the world: preparation of supramolecular complexes with gallic acid and glycyrrhizic acid (GC) and some of its salts , increasing their solubility in water and obtaining biofertilizers for agricultural crops from their processing industry waste are being conducted. The study of the chemical composition of the licorice plant in Uzbekistan has great national economic importance and prospects. The licorice plant exists in various soil and climate conditions of Central Asia. Populations in equal climatic conditions are distinguished by development conditions, environmental resistance to diseases and pests, productivity of underground and above-ground organs, and composition of nutrients with stable morphological characteristics. The main triterpenoid of the root of the licorice plant (Glycyrrhiza glábra), which is widely used in folk medicine, is GK and its salts are widely used in medicine. Abu Ali Ibn Sina summarized the results obtained in treatment with licorice root tincture in medieval Eastern medicine. It is known that today licorice root extract and its biologically active substances are included in many medicinal preparations and medicinal plant collections. One of the main biologically active substances in the licorice root extract is GK (I).

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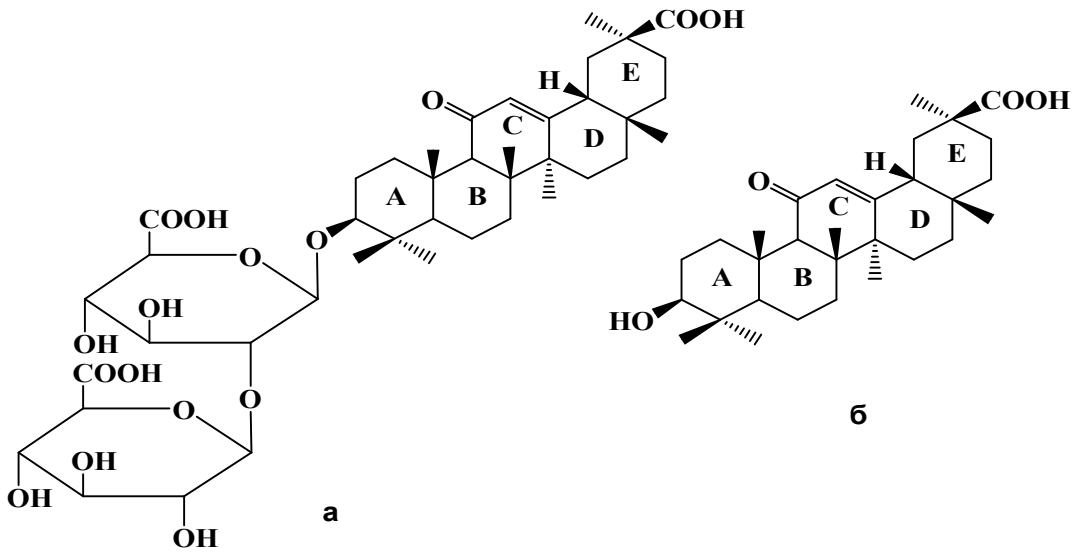

Figure 1. Glycyrrhizic acid (a) and glycyrrhetic acid (b).

GK and its derivatives, such as GKMAT, are used in the treatment of bronchial asthma, dermatitis, and eczema, and are produced under the trademark "Glysiram".

Obtaining supramolecular complexes of glycyrrhizic acid and mannoammonium salt with gallic acid and studying their biological activity is an interesting research direction.

1. Preparation of complex: to prepare supramolecular complexes in 1:2 and 1:4 ratios, first of all, it is necessary to mix gallic acid with glycyrrhizic acid and mannoammonium salt and provide special conditions (temperature, pH, solvent). During this process, various methods can be used for the formation of complexes, for example, evaporation or crystallization.

2. Study of biological activity: The following methods can be used to study the biological activity of the obtained complexes:

- Study of antioxidant activity: with DPPH or ABTS methods.

- Determination of antimicrobial activity: If tests are carried out on microorganisms, the method of disk diffusion or microbroth dilutions can be used.

- Study of anti-inflammatory activity: using animal model or in vitro studies.

3. Results and analysis: Analyzing the obtained data, it is possible to compare the biological activity of the complexes with the separate effects of glycyrrhizic acid and gallic acid.

Through this research, it is possible to determine the potential advantages of supramolecular complexes and explore the possibilities of their pharmaceutical application.

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Obtaining a supramolecular complex of GK with gallic acid (2:1).

Taking 1.646 g (0.002 M) of GK, 100 ml dis. it was dissolved in a mixture of water and 100 ml of alcohol at 50-600C, 0.17 g (0.001 M) of gallic acid was added to it, and then it was mixed in a magnetic stirrer for 4-5 hours. Alcohol was removed from the reaction mixture in a rotary evaporator, and the aqueous part was dried in a lyophilic dryer. Product - white powder: T.s..= 184-185oS Rf= 0.9 (system 2) Yield: 98.3% IR-spectrum n(ON,)=3318, n(SN, SN2, SN3)=2929, n(S =O)=1701, n(S11=O, C=C)=1615, n(SOO–)=1588, d(SN2, SN3)=1452, , d(SN)=1388, 1328, 1212, d(S–O–S, S–ON)=1165, n(S–O–S)=1035, d(=CH)=981. Supramolecular complexes of GK with gallic acid in the remaining ratios were also obtained by this method of synthesis: 1. GK: Gallic acid (2:1). White powder T.s..=184-185oS Rf= 0.8 (system 2) Yield 98.3%.

The remaining complexes were obtained in this way:

GK:GallK (4:1): White powder. The yield is 98.2%. T.s..=186±1oC. Rf 0.72 (acetone:benzene:acetic acid:water (4:1:1:1)).

GK:GallK (8:1): White powder. The yield is 97.7%. T.s..=188±1oC. Rf 0.7 (acetone:benzene:acetic acid:water (4:1:1:1)).

GK:GallK (10:1): White powder. Yield 98.55%. T.s..=190±5oC. Rf 0.7 (acetone:benzene:acetic acid:water (4:1:1:1)).

Synthesis of supramolecular complex of GKMAT with gallic acid (2:1).

4.47g (0.01mol) of GKMAT was dissolved in 100ml of 50% ethyl alcohol, then 1.7g (0.005mol) of GallK solution dissolved in 50ml of 50% ethyl alcohol was added and stirred for 4-5 hours on a magnetic stirrer at room temperature. The organic solvent was removed from the reaction mixture using a rotary evaporator. The aqueous portion was dried in a lyophilizer. Product - pale yellow powder: T.s..=192-193oC Rf= 0.9 (system 2) Yield: 98.6% IR-spectrum n(OH,)=3310, n(CH, CH2, CH3)=2879, n(C=O)=1701, n(C11=O, C=C)=1615, n(COO–)=1591, d(CH2, CH3)=1452, , d(CH)=1388, 1347, 1212, d (C–O–C, C–OH)=1211, n(C–O–C)=1037, d(=CH)=978 Yield 4.68g (95%). T.s..=192±1oC. Rf 0.65 (acetone:benzene:acetic acid:water (4:1:1:1)).

The remaining complexes were obtained in this way:

GKMAT:GallK (4:1): Yield 98.8%. T.s..=194±1oC. Rf-0.72 (acetone:benzene:acetic acid:water (4:1:1:1)).

1. GKMAT:GallK 2:1. Yield: 98.6%, T.s..= T.s..=192±10S, [α]D25= +72.0; (s=0.5%; 50 % NH4ON), IR spectrum: (nmax, cm -1) n(OH,)=3310, n(CH, CH2, CH3)=2879, n(C=O)= 1701, n(C11=O, C=C)=1615, n(COO–)=1591, d(SN2, CH3)=1452, , d(CH)=1388, 1347, 1212, d(C–O– C, C–OH)=1211, n(C–O–C)=1037, d(=CH)=978; UV spectrum, 50% C2N5OH (lmax, nm): 261 (lg e, 4.7¬), 218 (lg e, 4.78).

2. GKMAT:GallK 4:1. Yield: 98.8%, T.s..=194±10S, [α]D25= +60.0; (s=0.5%, 0.25% NH4OH), IR spectrum: (nmax, cm -1) n(OH,)=3376, n(CH, CH2, CH3)=2939, n(C=O)=1716, n(C11=O, C=C)=1621, n(COO–)=1590, d(CH2, CH3)=1452, , d(CH3)=1358, 1211, d(C–O– C, C–OH)=1173, n(C–O–C)=1031, d(=CH)=978; UV spectrum, 50% C2H5OH (lmax, nm): 258 (lg e, 5.0), (lg e, 4.7¬).

GK and its salts were obtained based on the methods presented in the literature. Some researchers noted the effectiveness of the extraction method of Glycyrrhiza glabra L. root mass based on extracting it in a high-temperature aqueous environment, forming a thick consistency in a vacuum-apparatus at the next stage, extracting in HNO3 solution (3% solution) and acetone.

Preparation of root extract of local licorice root (Glycyrrhiza glabra L.) and extraction of GK from its composition and chemical identification were carried out using standard methods. In order to obtain the supramolecular complex of GK with gallic acid, newly used organic solvents (ethyl alcohol, benzene, acetone), acid solutions, as well as alkali solutions and a number of soluble salt solutions were used to obtain gallic acid.

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