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PREPARATION OF SUPRAMOLECULAR COMPLEXES OF GOSSYPOL DERIVATIVES BASED ON GLYCYRRHIZIN ACID SALTS

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Abstract: Gossypol Schiff bases were synthesized and water-soluble supramolecular complexes of glycyrrhizic acid monoammonium salt (MASGA) in a ratio of 1:4 were obtained, taking into account the water insolubility of these substances. Some physico-chemical parameters of the complexes, their structure were studied by IR-, UV-spectra and computer calculation software.

Key words: Gossypol, primary amine, Schiff's base, substance, compound, licorice, triterpene glycoside, supramolecular complex.

Currently, a lot of scientific research is focused on creating methods for obtaining self-assembled large and small molecule complexes. Molecules in these complexes are formed not by covalent bonds, but by hydrogen bonds. In most cases, covalent bonding is the major part of this process.

MASGA (monoammonium salt glycyrrhizic acid) is known to form clathrates with poorly water-soluble drugs and become water-soluble. MASGA is a major triterpene glycoside isolated from the root of the licorice plant and has a number of unique physicochemical properties, one of which is its solubilization property.Therefore, by forming supramolecular complexes with drugs, MASGA dramatically increases their solubility in water, reduces their toxicity, and at the same time provides an opportunity to maintain the effectiveness of action even in very small doses.

When obtaining supramolecular complexes, 4 mol of MASGA was dissolved in 50% C_2H_5OH, 1 mol of Schiff's base was added to it, and the reaction was carried out at 50-60 ^{0}C for 6-8 hours with regular stirring. Ethyl alcohol was removed from the reaction mixture using a rotary evaporator, and the aqueous portion was lyophilized. Supramolecular complexes of thirty gossypol Schiff bases in 1:4 ratio were obtained. Some of their physico-chemical parameters were studied:

Supramolecular complexes of MASGA with Schiff bases were obtained according to the following scheme:

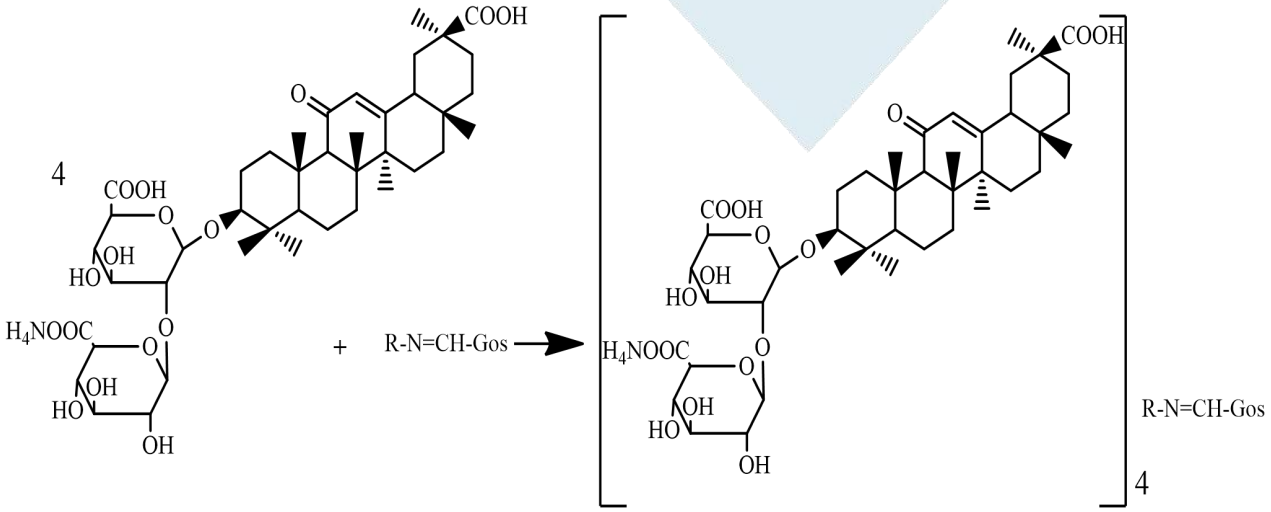

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Table-1

Some physicochemical constants of water-soluble supramolecular complexes of gossypol derivatives with MASGA

№	Supramolecular complex	Mol	Solubility	T_{luk} ^0C	R_f	Reaction yield, in %	Ранги
1	Di-(4-amino-2-methylphenol) gossypol + MASGA	1:4	H_2O	221-222	0,30[2]	98	Pale yellow
2	Di-(naphthylamine) gossypol + MASGA	1:4	H_2O	198-199	0.78[1]	92	Pale yellow
3	Di-(glucosamine) gossypol + MASGA	1:4	H_2O	201-202	0.56[1]	88	Pale yellow
4	Di-(benzylamine)gossypol + MASGA	1:4	H_2O	264-265	0,37[2]	87	Pale yellow

Systems: 1) Hexane-acetone 1:1 2) Hexane-acetone 1.5:1

When MASGA forms supramolecular complexes, the -OH and -COOH groups in it form a hydrogen bond and allow joining. In addition, the hydrophobic part of MASGA is affected by the hydrophobic parts of gossypol derivatives.

When the UV and IR spectra of the obtained supramolecular complexes were analyzed, it was revealed that the signals in the spectrum of Schiff bases were broadened due to the hydrogen bonds in the complex compounds.

When analyzing the IR spectrum of MASGA supramolecular complex with di-(4-amino-2-methylphenol)gossypol gossypol at 3091 cm^{-1}, it was revealed that the absorption maxima caused by the valence vibrations of the new –H=CH– bond changed and 3450.98-2873.94 In cm^{-1} we can see the absorption maxima due to bonds in the MASGA supramolecular complex.

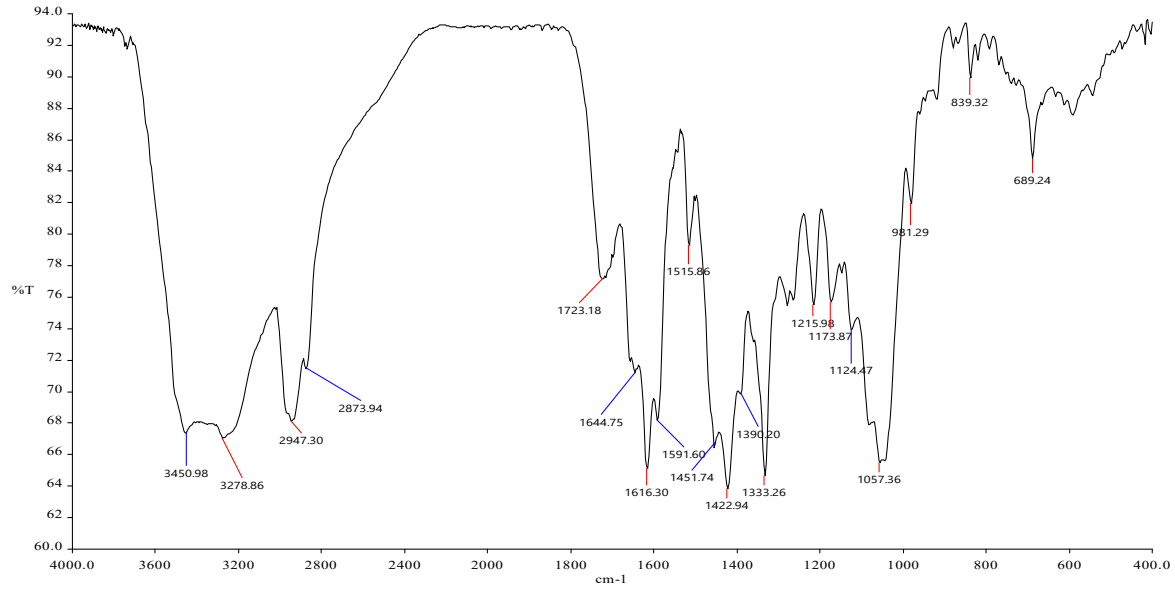

Figure 1. IR spectrum of di-(4-amino-2-methylphenol)gossypol +MASGA

When the UV-spectrum of MASGA supramolecular complex with di-(4-amino-2-methylphenol)gossypol was examined, it gave absorption maxima at 244.33-424.72 cm^{-1} for this substance.

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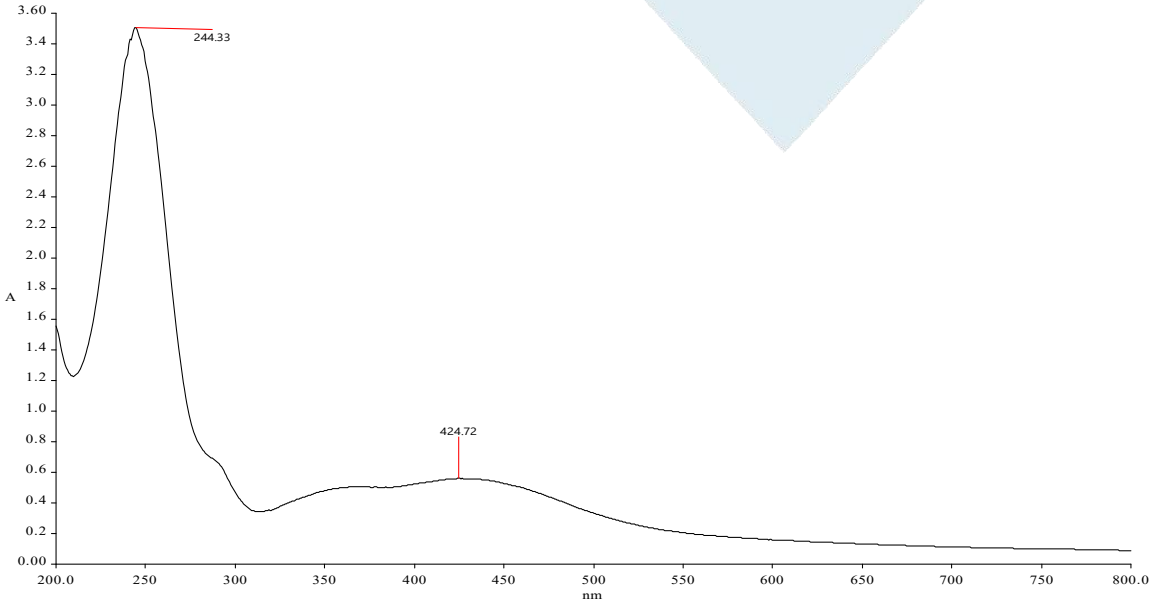

Figure 2. Di-(4-amino-2-methylphenol)gossypol+MASGA UV spectrum

When analyzing the IR spectrum of the Schiff base formed by 4-amino-2-methylphenol with gossypol, the absorption maxima at 3240-3430 cm-1 belonging to the $–NH_2$ group at 3091 cm^{-1} are due to the valence vibrations of the new –H=CH– bond. we can see the maxima.

The approximate structure of the synthesized substances was studied using computer modeling software. These quantum-chemical calculations were carried out in the ChemOffice program using the molecular mechanics (MM2) method with an empirical force field.

Model of MASGA supramolecular complexes with gossypol derivatives based on computer calculation

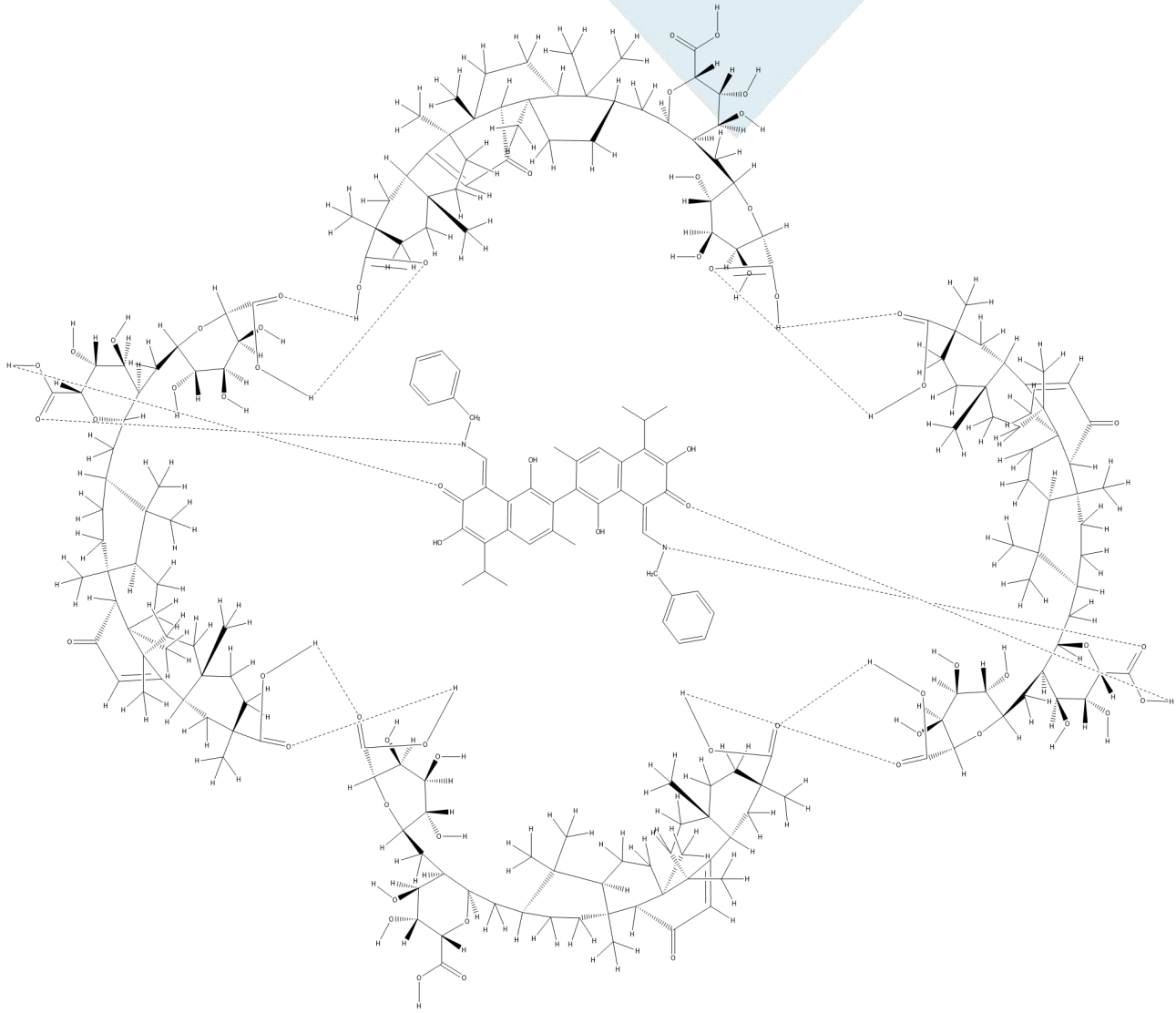

Figure 3. 1:4 with MASGA of gossypolidene benzylamine

model of the supramolecular complex in proportion

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