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SYNTHESIS OF HISTIDINE DERIVATIVE WITH SUCCINIC ACID AND STUDY OF ITS PHYSICOCHEMICAL PROPERTIES

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Abstract: Histidine molecule has an amine group, a carboxyl group and an imidazole ring. This structure determines its physical and chemical properties. In histidine, the ring of heterocyclic amine imidazole is a basic group, which also shows the aromaticity of histidine. Histidine is one of the natural compounds, the source of the reagent provides an opportunity to obtain various supramolecular complexes based on reversible and heterocyclic compounds and to study their biological activity and stability. Histidine (H) and its derivatives are important in the formation of complexes, and it is histidine (H) and formation of complexes with its derivatives and the study of the stability of the formed complexes is important for the good growth and development of living organisms, especially the fact that it is important for the good assimilation of microelements in plants and animals increases its relevance.

In our research, complexes of histidine (H) and succinic acid with different ratios were obtained and some physicochemical parameters were studied.

Key words: Succinic acid, histidine, amino acid, dicarboxylic acid ninhydrin test, chromatography, IR spectroscopy, histamine.

Annotatsiya: Gistidin molekulasida amin guruhi, karboksil guruhi va imidazol halqasi mavjud.Bu tuzilish uning fizik-kimyoviy xossalarini belgilaydi.Gistidinda geterotsiklik amin imidazolning halqasi asosli guruh bo'lib, ayni paytda gistidinning aromatikligini ham ko'rsatadi.Gistidin tabiiy birikmalardan bo'lib, reagentning olinish manbasi tiklanuvchan va getrohalqali birikmalar negizida turli xil supramolekulyar komplekslar olish va ularning biologik faolligi hamda barqarorligini o'rganish imkoniyatini beradi.Komplekslar hosil qilishda gistidin (H) va uning hosilalari ahamiyatli bo'lib, tarkibida karboksil saqlagan birikmalarning aynan gistidin (H) va uning hosilalari bilan komplekslar hosil qilishi va hosil bo'lgan komplekslarning barqarorligini o'rganish, tirik organizmlarning yaxshi o'sib rivojlanishida muhim ahamiyat kasb etadi, xususan o'simlik va hayvonlardagi mikroelementlarning yaxshi o'zlashtrilishida muhim ahamiyat kasb etishi uning dolzarbligini yanada oshiradi.

Bizning tadqiqotlarimizda, gistidin (H) va yantar kislotaning bilan turli nisbatdagi komplekslari olinib, ayrim fizik-kimyoviy paremetrlari o'rganildi.

Kalit so`zlar: yantar kislota, gistidin, aminokislota, dikarbonkislota ningidrin testi, xromotografiya, IQ spektroskopiya, gistamin

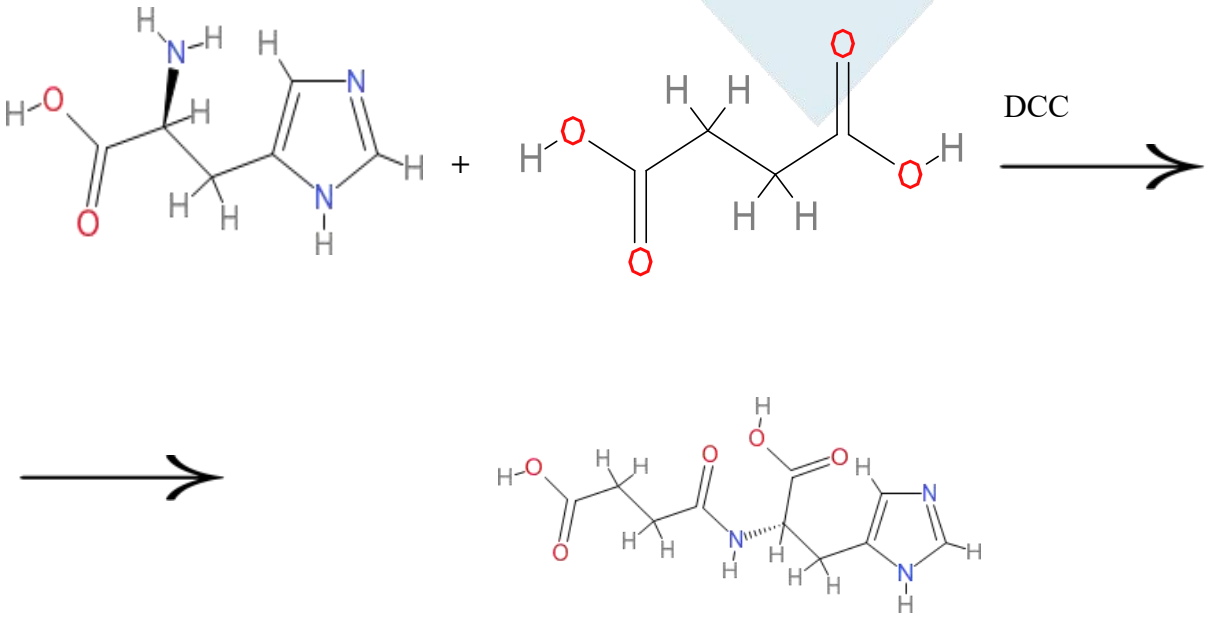
Аннотация: Молекула гистидина имеет аминогруппу, карбоксильную группу и имидазольное кольцо. Такое строение определяет ее физические и химические свойства. В гистидине кольцо гетероциклического аминоимидазола является основной группой, которая также проявляет ароматичность гистидина. одно из природных соединений, источник реагента дает возможность получать различные супрамолекулярные комплексы на основе обратимых и гетероциклических соединений и изучать их биологическую активность и стабильность. Гистидин (H) и его производные имеют важное значение в комплексообразовании. это гистидин (H) и образование комплексов с его производными и изучение устойчивости образующихся комплексов важно для хорошего роста и развития живых организмов, особенно то, что он важен для хорошего усвоения микроэлементов растениями и животные повышают его актуальность.

В наших исследованиях были получены комплексы гистидина (H) и янтарной кислоты в различных соотношениях и изучены некоторые физико-химические параметры.

Ключевые слова: янтарная кислота, гистидин, аминокислота, нингидриновая проба с дикарбоновой кислотой, хроматография, ИК-спектроскопия, гистамин.

Histidine is one of the 20 important amino acids. If we pay attention to its structure, it is easier and more functional to form a complex with other substances than other amino acids, because if we pay attention to its structure, it has imidazole group, carboxyl, which allows to form a complex. group and amino groups. We can see that histidine reacts with carboxylic acids to form amides due to the amino group. It also forms various complexes with metals. For example, it helps to ensure good absorption of heavy metals found in the body and complexes with them creates. Complexes of metal cations with amino acids can be used as models to study the pharmacological effects of drugs. The formation of such complexes can reduce the toxic effects of some metal ions. These complexes have important pharmacological and toxicological properties and are attracting the attention of many people today. Also, aluminum has a harmful and toxic effect on the human body. It can enter the human body from the environment, food or drugs and enters the systemic circulation from the gastrointestinal tract, lungs or parenterally (hemodialysis or parenteral nutrition). Since Al^{3+} is the hardest metal ion, it forms complexes with enhanced stability with ligands containing hard donor groups. The most effective are ligands with strongly basic, negatively charged oxygen atoms (phenolates, alkoxides, carboxylates, phosphonates, etc.) and nitrogen atoms, which are appropriately placed inside the ligand molecule to form five- or six-membered metal rings. .Amino acids have amino acid and carboxylate groups capable of binding metal ions. Although amino acids usually do not form strong complexes with aluminum ion, those with effective side chain donors (glutamic, aspartic) can form chelates of significant stability with Al^{3+} ion due to favorable steric arrangement of donor groups.

Obtaining the derivative of histidine with succinic acid using modern theoretical and experimental methods of chemistry and researching its physical and chemical properties. During this reaction, pure histidine and succinic acid are obtained. We need to activate the acid. For this, we use DCC (dicyclocarbodiimide). Then the activated succinic acid is treated with histidine. (Figure 1.1)



Interaction reaction of histidine with succinic acid

Analysis of the obtained results and results: Let's consider the IR spectrum of histidine and succinic acid. (Fig. 1)

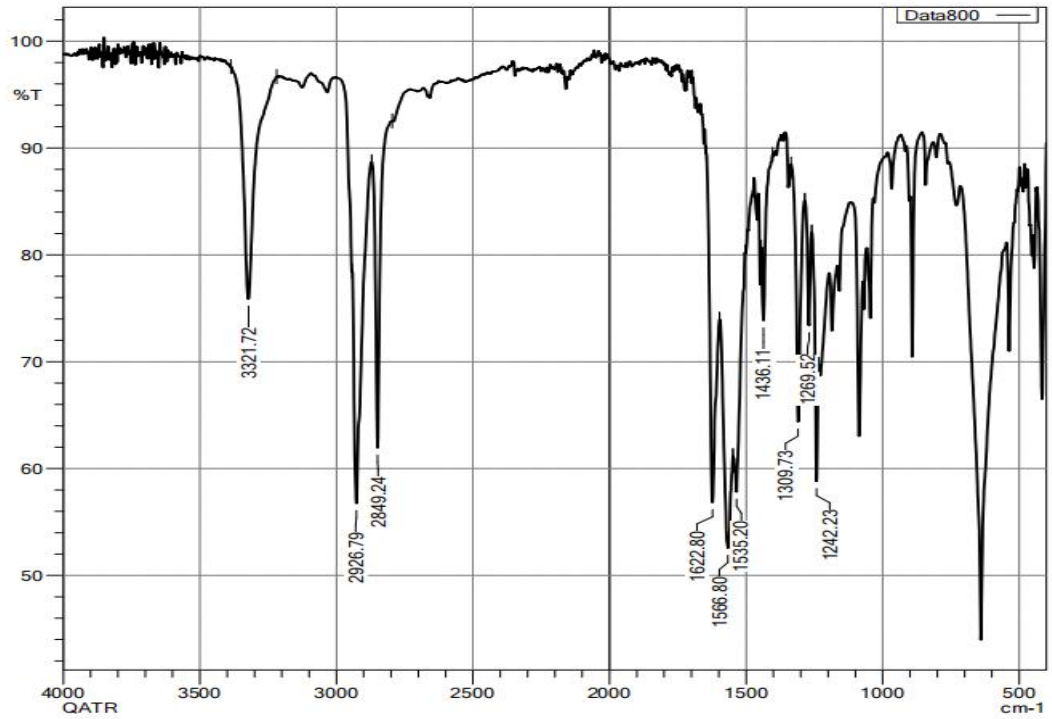


Fig. 1: IR spectrum of histidine derivative with succinic acid

The IR spectrum of the histidine derivative was recorded using an IR-Fure spectrophotometer (Perkin-Elmer Spectrum IR-10.6.1; USA) in the absorption range of 4000-400 cm–1. In the experiments, a new derivative of histidine and succinic acid was synthesized. and on the basis of their IR-Fure spectra, in the range of 4000-400 cm–1 in the range of 4000-400 cm–1, shifts were noted in the valence fields compared to the indicators of the initial reactants. These bonds are reflected in the region of 3100-3500 cm -1 . In the broad region of 2900-3000 cm -1 there is a peak characteristic of C-H. In the fingerprint region, 1622 cm - 1 C=O carbonyl is a domain characteristic of amides.

Physical and chemical properties of the product

Molecular formula	$C_{10}H_{13}N_3O_5$
Product name	1-Carboxylic-2-(1H-imidazol-5-yl)-ethylamino-4-oxobutanoic acid
Molecular mass	255.23 g/mol
Melting temperature	283 C
Boiling temperature	337 C
pH	7.3
Color	White crystal

Conclusions and recommendations:

1. Derivative of histidine with succinic acid was obtained and this substance was named 1-carboxylic-2-(1H-imidazol-5-yl)-ethylamino-4-oxobutanoic acid.

2. Their chemical structures were analyzed based on physico-chemical and spectral methods.

3. In chemistry, the structure of the obtained substance was analyzed using computer modeling programs.

4. The method of obtaining the derivative of histidine with succinic acid was developed.

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