ГИДРОКСИПОЛИКАРБОНКИСЛОТА ВИНИЛ ЭФИРЛАРИ СИНТЕЗИ

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Аннотация. Ушбу мақолада кўп асосли карбон кислоталардан 2 гидроксипропан 1,2,3 трикарбон кислотасини гомоген усулда диметилформамид (ДМФА) эритмасида рух ацетат ва $AlCl_3$•$6H_2O$ катализаторлари иштирокида виниллаш реакцияси орқали уларнинг моно-, ди- ва тривинил эфирлари синтези, реакциянинг оптимал шароитлари ёритилган.

Калит сўзлар. лимон кислотаси, диметилформамид (ДМФА), рух ацетат, катализатор, виниллаш реакцияси.

СИНТЕЗ 2-ГИДРОКСИПРОПАНА 1,2,3 ТРИКАРБОНОВОЙ КИСЛОТЫ ВИНИЛОВЫХ ЭФИРОВ

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Аннотация. В данной статье описан синтез моно-, ди и тривиниловых эфиров из многоосновных карбоновых кислот, в том числе 2-гидроксипропана 1,2,3 трикарбоновой кислот, в гомогенном растворе диметилформамида (ДМФ) в присутствии ацетата цинка и катализаторов AlCl3 • 6H2O.

Ключевые слова: лимонная кислота, диметилформамид (ДМФА), ацетат цинка, катализатор, реакция винилирования.

SYNTHESIS OF 2-HYDROXIPROPANE 1,2,3 TRICARBONIC ACID VINYL ETHERS

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Abstract. This article describes the synthesis of mono-, di- and trivinyl esters from dibasic carboxylic acids, including 2-hydroxipropane 1,2,3 tricarbonic acids, in a homogeneous solution of dimethylformamide (DMF) in the presence of zinc acetate and $AlCl_3 \cdot 6H_2O$ catalysts.

Keywords: citric acid, dimethylformamide (DMFA), zinc acetate, catalyst, vinyl reaction.

Today, with the help of modern innovative technologies, many biologically active, unique organic compounds with unique properties are obtained based on the diversification of the oil and gas industry. [1; 3-5 б]. The industrial production of vinyl acetate from acetic acid has made acetylene one of the most important raw materials in the chemical industry. [2; 45-49 б, 3; 221-224 б, 4; 172-175 б, 5; 149-150].

There are various methods for the preparation of vinyl esters, the most common of which is catalytic vinylation in the presence of acetylene from organic compounds containing the corresponding active hydrogen. There are various methods for the preparation of vinyl esters, the most common of which is catalytic vinylation in the presence of acetylene from organic compounds containing the corresponding active hydrogen[6; 3079-3160 б, 7; 78-82 б, 8; 1747-1787 б]. Hydroxy acids are biologically active compounds and are therefore used as additives in perfumery, cosmetics, and the food industry. The introduction of a vinyl group into their molecule reduces their acidity and can increase their biological activity.

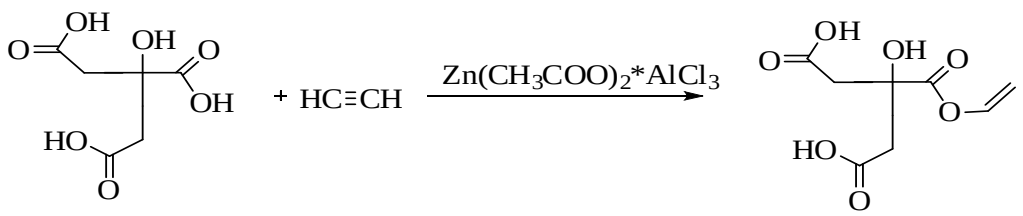
Vinyl esters of carboxylic acid have biological activity and are used in medicine for the treatment of various diseases, open wounds, pain relievers, and in chemistry and electrical engineering as solvents and as a starting material for many drugs[9; 177-179 б].

The vinylization of aliphatic and aromatic alcohols and some representatives of acetylenic alcohols, as well as the synthesis and use of the vinyl ester of acetic acid from carboxylic acids, are well covered. However, the production of vinyl esters of two basic carboxylic acids, monovinyl esters or divinyl esters, has not been studied. Low-toxic biomaterials based on divinyl ethers are obtained by photopolymerization[10; 22-23 б].

In this study, the reactions of citric acid from hydroxy acids hydroxy acids with acetylene were studied. In these reactions, the DMF-catalyst system was used. DMF-catalyst system is a catalytic system that is prepared by melting the salt with the formula $Zn(CH_3COO)_2$ as a catalyst in a dimethylformamide solvent environment and dissolving it as a 10% $AlCl_3$ cocatalyst in relation to the zinc acetate mass.

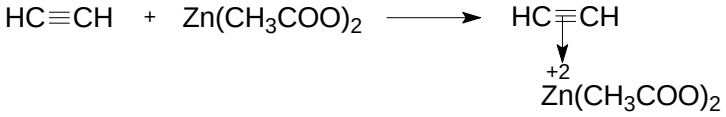
Consider the mechanism of the citric acid vinylation reaction:

1-схема

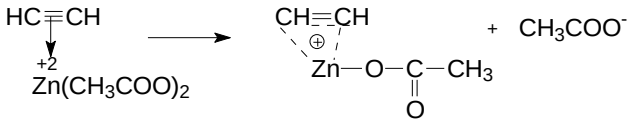


The monovinyl ether formed by the acid reacts with acetylene in the presence of a catalyst to form divinyl ether.

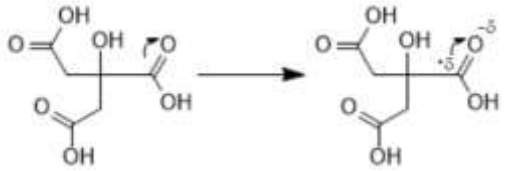
Let's consider the mechanism of the reaction of vinyl in the example of citric acid. Initially, the zinc acetate catalyst forms π-complex by interacting with acetylene in the DFM environment.



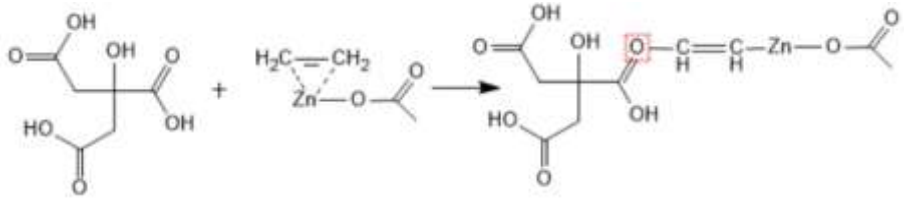
From the formed π-complex, the one bond of acetylene is cut off, and then the anion of δ- complex and acetic releases.



Due to the high negative charge value in oxygen in the carbonyl group of citric acid, oxygen in the solvent environment has a partial negative charge.

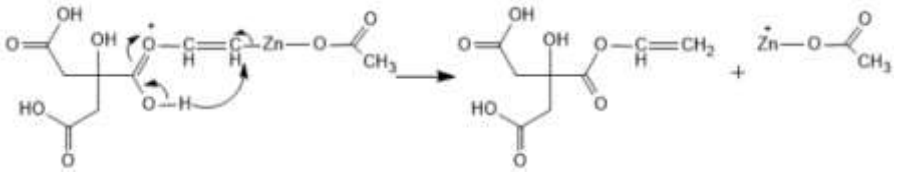


The vinyl acetate cation and the acid anion form the complex 1 by interacting with each other.



1

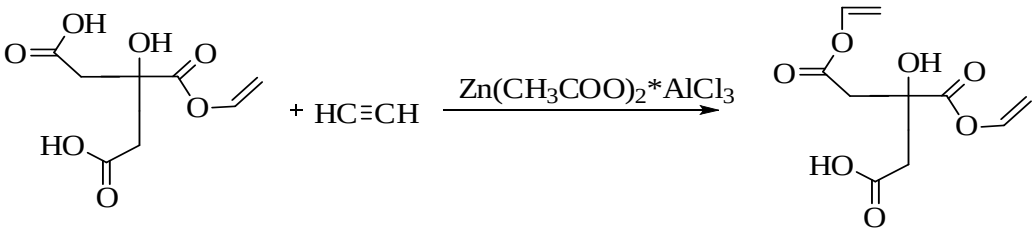
The formed citric acid undergoes the compound of mono vinyl ether with aceto-zinc β-elimination, then its mono vinyl ether forms 2.



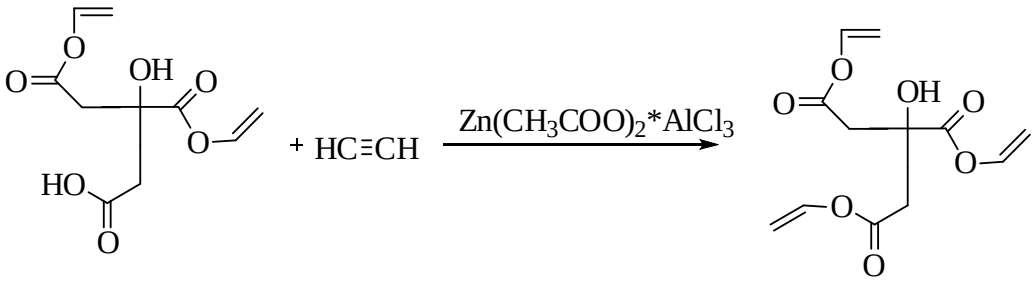
2

In the same order, the second and third carboxyl groups are also vinylized and then divinyl (2-schema) and trivinyl ethers of citric acid are formed (3-schema). The process, of course, takes place through the formation of the complex of mono vinyl with aceto-zinc and the complex of divinyl acid with aceto-zinc.

2-schema



3-схема



We consider the potential energy surface (PES) values of intermediate complexes formed during these processes.

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