

About The Dimeration Process Of 1-HEXEN

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ABSTRACT: The dimerization process of 1-hexene was studied. The effect of catalysts on the course of the process was compared. As a catalyst, a catalyst prepared by soaking sulfuric acid, ammonium sulfate, and iron (II) sulfate in gamma alumina was used.

KEYWORDS: dimerization process, dimerization of olefins, oligomerization of olefins, catalyst sulfate gamma aluminum oxide.

I. INTRODUCTION

The role of the chemical industry in the development of the industry plays an important role. Today, the rapid development of the chemical industry leads to an increase in demand for many substances. In particular, the need for double-bond substances obtained on the basis of oligomerization of higher olefins is growing every year. This is due to the fact that high α -olefins are raw materials for the production of high-quality synthetic marmot materials. [1]

Styrene and α -methyl styrene dimers are used as a means of controlling the molecular weight of polymers and rubbers, plasticizers, heat-resistant materials, solvents for paints and varnishes, monomers for the production of gas-separating polymer membranes. [2]

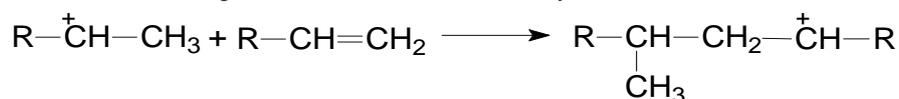
Dimerization of olefins is an important stage in their processing. Because from such dimerized substances it is possible to obtain products for the industry of basic organic synthesis.

Olefin dimerization is the process of dimer formation (aggregation of 2 molecules) as a result of coupling reactions. In this process, in the presence of mineral acids (proton donor H^+), the proton binds to double communication in the alkene molecule. [3]

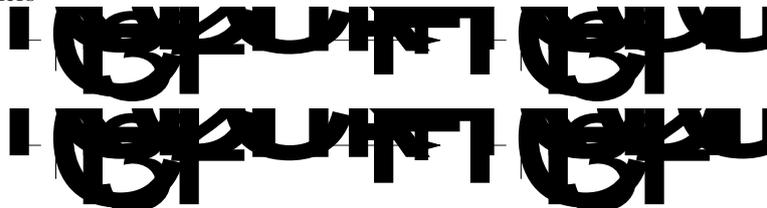
The following carbocations are formed:



This carbocation binds to the following alkene molecule and a carboxylic dimer forms:



As a result of the release of the proton from dimercarbation, it stabilizes, and the alkene dimerization product is a mixture of dialkene isomers



II. SIGNIFICANCE OF THE SISTEM.

The experimental section.

Hexene and its isomers were fractionated by distillation. Fractionation was carried out based on the boiling points of hexene and its isomers, as shown in table 1 below.

The presence of quince in the isolated olefins was investigated by the following method. In this case, 1-2 drops of an aqueous solution of potassium permanganate are added to the olefin samples and shaken. After a few seconds, the

violet color starts to load. This indicates that the olefin is oxidized by potassium permanganate to form glycols. The reaction can be described as follows:

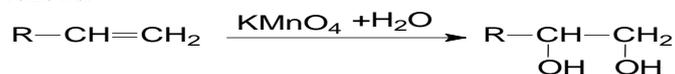


Table 1
Physico-chemical properties of hexen and its isomers

№	The name of Olefin	Quantitative content, %	T _{BOILING} °C	n _D ²⁰	D ₄ ²⁰
1.	Hexen-1	21,5	63,5	1,3879	0,6731
2.	2-methyl-1 -penten	4,7	62,1	1,3920	0,6771
3.	3 -methyl-1 -penten	2,5	54,2	1,3842	0,6675
4.	3-methyl-2-penten (cis)	3,3	70,2	1,4045	0,6986
5.	2-ethyl-1-butene	21,0	64,7	1,3967	0,6896
6.	2-ethyl-1-pentene	40,1	64,7	1,3967	0,6896
	The remainder	6,9	t >100	1,485	

A catalyst with three different compositions was prepared for the synthesis of 1-hexene dimer.

III. THE EXPERIMENTAL RESULTS

In order to study the dimerization process of 1-hexene, the necessary catalysts are prepared. For this, sulfuric aluminum oxide was used in the study of the dimerization process.

In the process, alumina was used in the gamma state. To do this, the alpha state oxide was transferred to the gamma state when heated to a temperature above 400 ° C in a drying oven. Aluminum oxide acts as a carrier.

Physical properties of gamma alumina:

Density 3.68 g / ml.

Liquefaction temperature 2044°C

The boiling point is about 3000°C.

Concentrated sulfuric acid was also used in this process.

1. Preparation of sulfate catalyst

For this purpose, a concentrated 2M sulfuric acid solution was first prepared. Take 100 ml of the prepared 2M solution, place it in a flat-bottomed flask and add 2 g of gamma alumina. The mixture was stirred in a magnetic stirrer for 1 hour at room temperature. The resulting solution was filtered and dried in an oven at 120 ° C for 2 hours. Then it turned into a black thick substance.

2. Preparation of ammonium sulfate catalyst

In the preparation of this catalyst, 100 ml of ammonium sulfate salt and 2 g of gamma-alumina were added to a bottle with a flat bottom. The mixture was stirred in a magnetizer at room temperature for 1 hour. The resulting mixture was filtered and then dried in an oven for 2 hours.

3. Preparation of an iron-based sulfate catalyst In the preparation of an iron-based sulfate catalyst, 1.4 g of an iron sulfate salt is dissolved in 6 ml of distilled water in a flat-bottomed flask. 10 g of sulfated gamma-alumina was added to the molten iron sulfate from the catalyst. Decision completed.

In the polymerization of olefins, the Stigler-Natta catalyst system absorbed in the magnesium-iron preservative component was used. In this case, alkaline aluminum was used as a catalyst, and organosillan was used as external electron donors [3-4].

A. Obtaining the IR spectrum and NMR of the obtained substance

In this experiment, the effect of the nature of the catalyst on the dimerization of hexen 1 was studied. The substances (NH₄)₂SO₄·γAl₂O₃, FeSO₄·γAl₂O₃, H₂SO₄·γAl₂O₃ were chosen as catalysts. Dimerization of 1-hexene was carried out at a temperature of 60 ° C in the presence of catalysts. The resulting substances were investigated in the IR spectrum. The results were analyzed.

Based on the data in this IR spectrum, the presence of an absorption region of 2951.22 cm⁻¹ indicates the presence of a -CH₃ group, the presence of an absorption region of 1644.39 cm⁻¹ indicates the presence of a -C = C group, the presence of an absorption region of 1456.32 cm⁻¹ indicates the presence of a -CH₂ group.

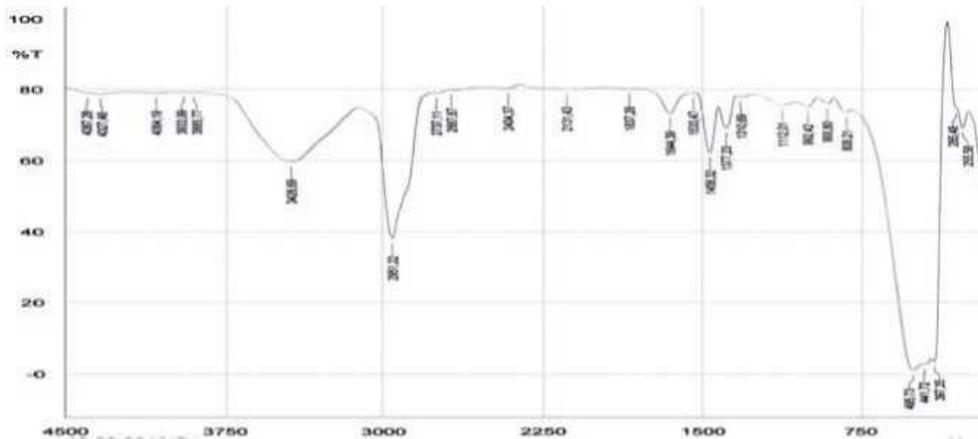


Figure 1.Hexene dimerization product based on H2SO4 * gA1203-catalyst IR spectrum of 5-methyl 6-undecene.

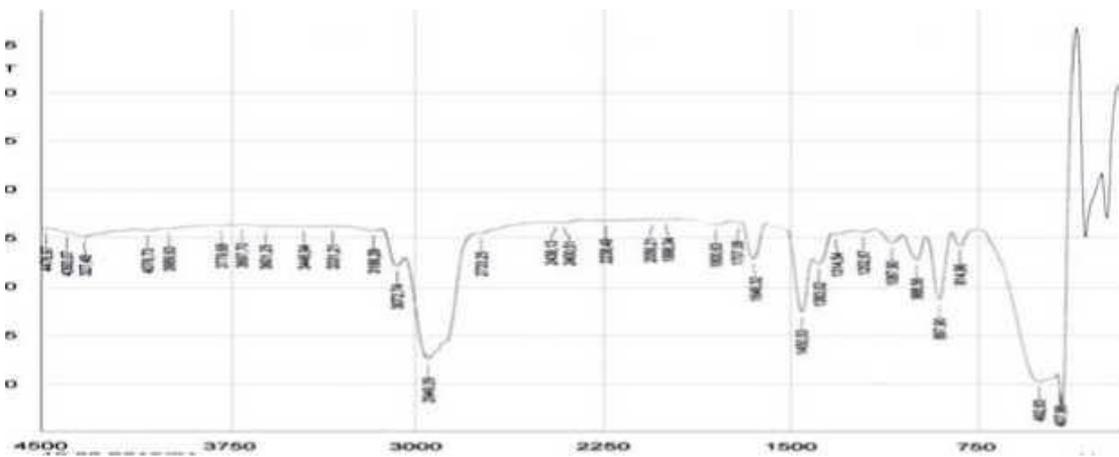


Figure 2 The product of the hexene dimerization based on the catalyst (NH₄)₂SO₄*γAl₂O₃ IR spectrum of 5-methyl 6-undecene.

In the IR spectrum of 5-methyl 6-undecene, absorption lines corresponding to the -C=C bonds in the 1647 cm⁻¹ region and stretching vibrations specific for the SN₃ group in the 2949 cm⁻¹ region were detected. Thus, it was found that various catalysts affect the process of dimerization of hexene 1..

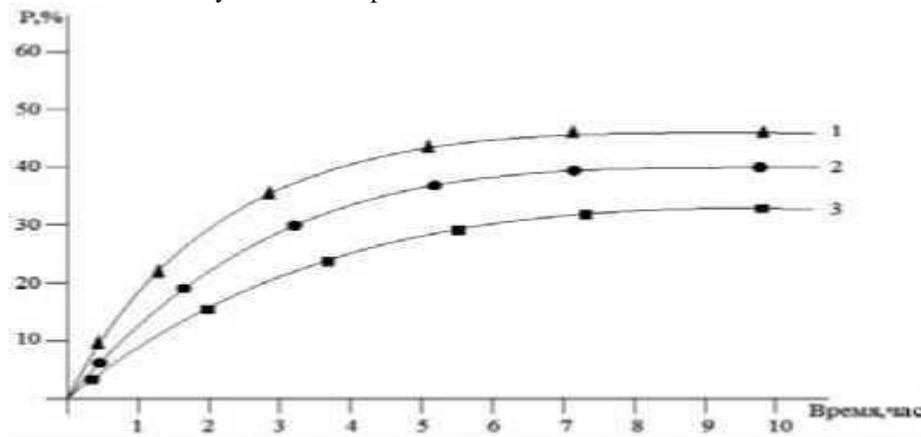


Figure 3. Effect of catalysts on dimerization of hexen-1.

- 1- FeSO₄*γAl₂O₃; 2- (NH₄)₂ SO₄*γAl₂O₃; 3- H₂SO₄*γAl₂O₃

1-hexane = 0.16 mol, t = 60 ° C

Figure 3 shows that the most active catalyst $(NH_4)_2 \cdot \gamma Al_2O_3$ in the dimerization process. Determination of the structure of the synthesized substances by the spectrum of NMR 1H and ^{13}C . The study of the structure of the products synthesized in 1H and ^{13}C NMR spectroscopy was performed on NMR apparatus 1H and ^{13}C at 400 Hz.

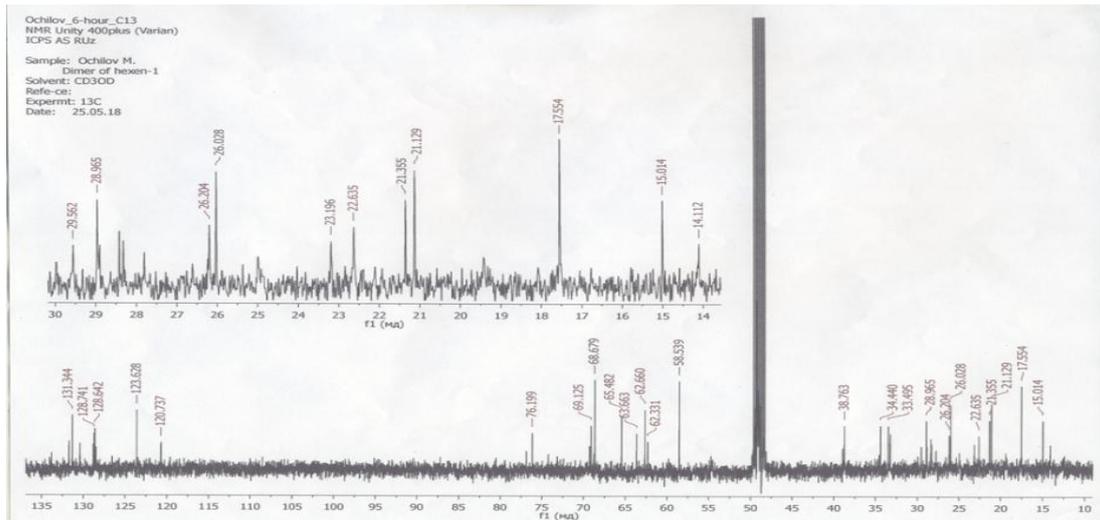


Figure 4. NMR spectrum of hexene dimerization product based on catalyst $(NH_4)_2SO_4 \cdot \gamma Al_2O_3$ - 5-methyl 6-undecene

The analysis shows that the CH_3 group is swallowed up in the area of 14.11 m. In the area of 17.55 m, we can see that the CH_2 group was swallowed. In the area of 26.2 m the CH group is absorbed.

IV. CONCLUSION AND FUTURE WORK.

Industrial development today leads to an increase in demand for many substances. In particular, the need for double-bonded substances based on oligomerization of higher olefins is growing every year. This is due to the fact that high α -olefins are raw materials for the production of high-quality synthetic marmot materials. The substance obtained by dimerization of hexene-1 is also used as a raw material in many industries.

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