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Lab report

Title and abstract

Synthesis of cyclohexene and cyclohexanol

In the first part of the experiment, cyclohexene will be prepared. It has a much lower boiling point (83°C) than the reactant cycloher-anol (161.5°C). Therefore, it is easily removed from the reaction mixture as it is formed by the technique of distillation. As it distills, water will also distill over into the receiving flask since its boilingpoint is only 100°C. The removal of the product as it forms, continually shifts the equilibrium reaction (just shown) to the right favoring the reaction to go to completion.

Objective and introduction

Obtain cyclohexene by thermal dehydration in an acid medium

•Isolate and purify cyclohexene by simple distillation and a drying agent

•Write the mechanism of the reaction

•Determine the % yield

•Characterize cyclohexene by qualitative chemical tests to determine the presence of carbon-carbon

double bonds in organic molecules and by IR

Procedure and materials

20.0 g cyclohexanol

8 mL H_3PO_4

Mix well

Add the boiling stones

Assemble the fractional distillation equipment

Connect the water hoses

Heat and collect the distillate without drying out the ball

Do not allow temperature to exceed 100 degrees

After adding 4 mL of NaCl and 4 mL of 10% sodium carbonate, place the mixture in a separatory funnel and separate the phases (upper organic phase, lower aqueous phase).

Dry the solution with CaCl2

Let it rest for 20 minutes

Decant

Collect what distils between 80-85 degrees Celsius

in a previously weighed vial

Determine the experimental yield (mass of the filled vial – mass of the empty vial

Characterize with Br2 and IR

Results

When I calculated the theoretical grams I got a total of 16.42 theoretical grams. When performing the % performance I got a total of 11%.

Discussion

Through this experiment I could see that the purpose of this experiment was to obtain cyclohexene by thermal dehydration in an acid medium. Isolate and purify the cyclohexene by simple distillation and a drying agent. Characterize cyclohexene by qualitative chemical tests to determine the presence of carbon-carbon double bonds in organic molecules and by IR. When I calculated the theoretical grams I got a total of 16.42 theoretical grams. When performing the % performance I got a total of 11%. The percentage obtained in the theoretical yield could be due to the fact that part of the product will remain in the ball. In the case of melting and boiling points, the ranges mentioned in the manual were used, unless the ball was drying out in this way, it automatically turned off. Since the manual referred to the ranges which could not be exceeded. In the infrared, the comparative table was used to determine if the ranges of the bands obtained had similarities or some differences, in my case all the bands obtained experimentally were similar to those in the literature. In the c c alkene the literature stipulated 1438.36

and experimentally I obtained 1437.48, while in C-H sp3 alkane the literature stipulated 2927.4 and experimentally I obtained 2924.66. In the case of C-H sp2 alkene, the literature stipulated 3023.20 and experimentally I obtained 3022.82. And finally CH2 bending the literature stipulated 1438.36 and experimentally I obtained 1437.48.

Some sources of error in the experiment could be, in my case, the air conditioning caused the process for the vapors to reach the thermometer to take longer and the temperature to rise.

Reference

Grande, J. C. (2020). *Lab. Química Orgánica II / Informe 6. Síntesis del Ciclohexeno a partir la deshidratacion del Ciclohexanol via Eliminacion Unimolecular 1 (E1)*. https://www.academia.edu/41972457/Lab_Qu%C3%ADmica_Org%C3%A1nica_II_Informe_6_S%C3%ADntesis_del_Ciclohexeno_a_partir_la_deshidratacion_del_Ciclohexanol_via_Eliminacion_Unimolecular_1_E1_

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