

Dehydration of 2-methylcyclohexanol

Lab Report

NAME: _____

PARTNER'S NAME: _____

LAB SECTION: _____

DATE: _____

% SCORE:

	Pts possible	Pts received
Lab Notebook		
Abstract		
Mechanisms		
GC Results summarized		
Questions		
Discuss your results		
Total	50	

Abstract



B. REACTION MECHANISMS-show a stepwise mechanism for:

(a) Formation of the major product:

(b) Formation of the minor product:

C. Gas Chromatograph Results :

Attach a copy of your chromatogram to this report (label with your name and compounds)

(a) 1-Methylcyclohexene: Draw the structure in the box:

Retention Time: _____

Peak Area: _____

Percent Formed in Reaction: _____

Fill in the blank with either "major" or "minor": This is the _____ product.

(b) 3-Methylcyclohexene: Draw the structure in the box:

Retention Time: _____

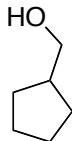
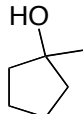
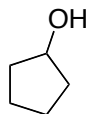
Peak Area: _____

Percent Formed in Reaction: _____

Fill in the blank with either "major" or "minor": This is the _____ product.

D. QUESTIONS:

1. Rank the following compounds in order of increased reactivity in a dehydration reaction that follows the E1 mechanism proposed in this lab. Number each structure from fastest (1) to slowest (3) reacting.



2. Gas chromatography is based on similar principles used in TLC and column chromatography. Identify the mobile phase and stationary phase used in the GC. If you had some starting alcohol in your distilled product mixture would you expect it to have a shorter or longer retention time than your products? Explain your answer to part c.

a. Mobile Phase:

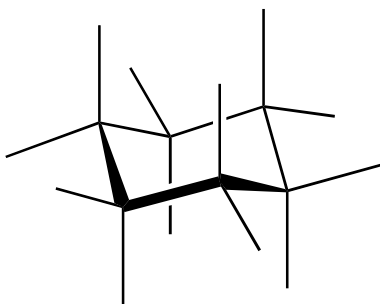
b. Stationary Phase:

c. Alcohol Retention Time:

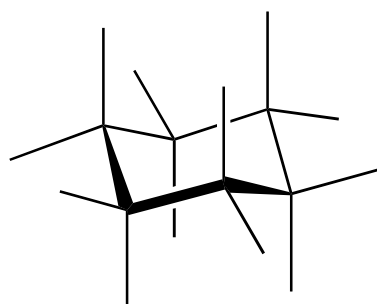
3. How many unique carbons does 2-methylcyclohexanol possess? _____
4. State a chemical test that would allow you to confirm that the product of dehydration reaction contained a carbon-carbon double bond. What observations would you make in a positive test?
5. Phosphoric acid is a catalyst for this dehydration experiment. What does it mean to be a "catalyst"? Explain why the reaction would not take place without an acid present

6. The 2-methylcyclohexanol used in this experiment is a mixture of stereoisomers.
- a. Add hydrogens, hydroxyls and methyl groups to the chair structures below to complete the most stable chair conformation for each isomer. Assume the methyl group is a larger group than the hydroxyl group.

cis-2-methylcyclohexanol



trans-2-methylcyclohexanol



- b. If dehydration of 2-methylcyclohexanol proceeds by an E1 mechanism would you expect a cis isomer to react faster than the trans isomer? Explain
- c. If dehydration proceeds by an E2 mechanism would you expect a difference in reactivity? Explain

E. DISCUSSION

Discuss your experiment, citing any pertinent data. Was your dehydration successful? Why was distillation a good method for isolating the product? Was Zaitsev's Law followed in this dehydration reaction? Why or why not?