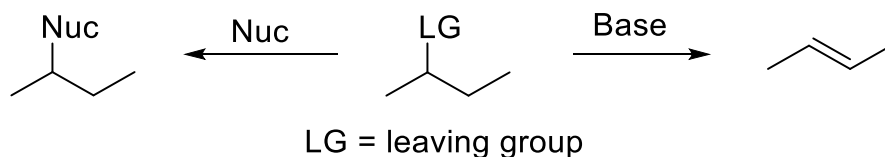
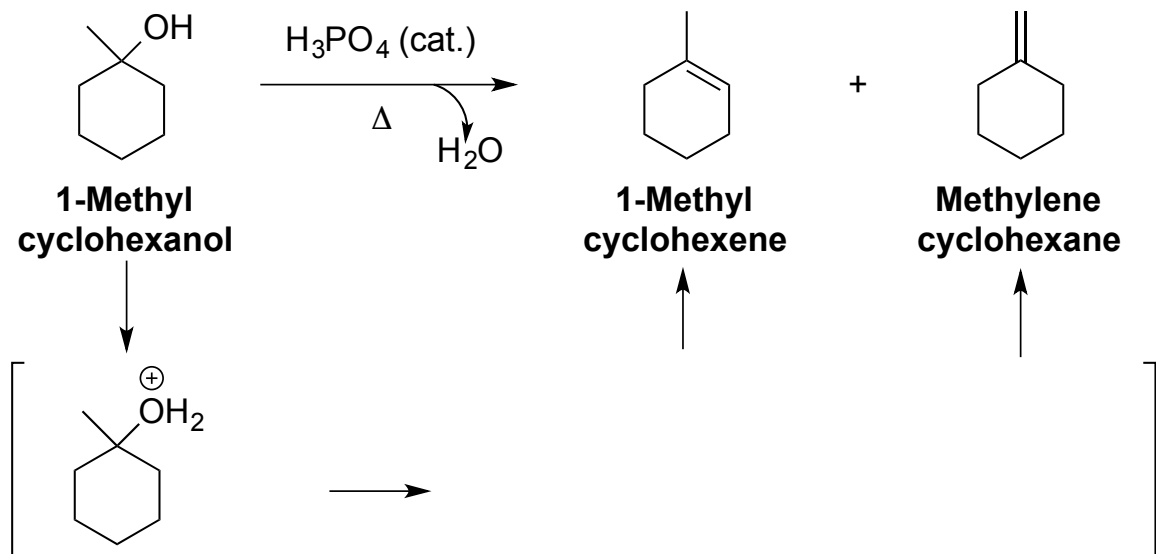
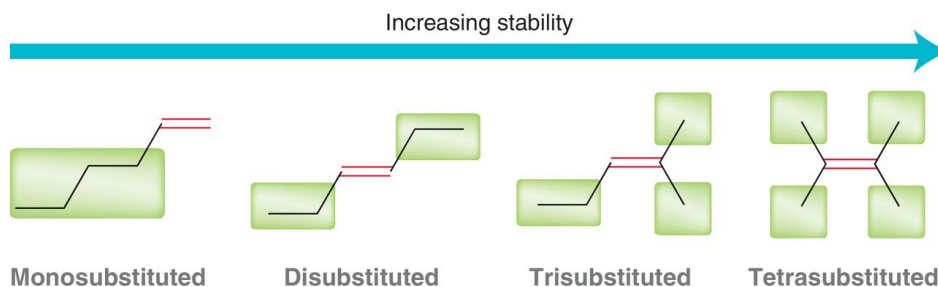
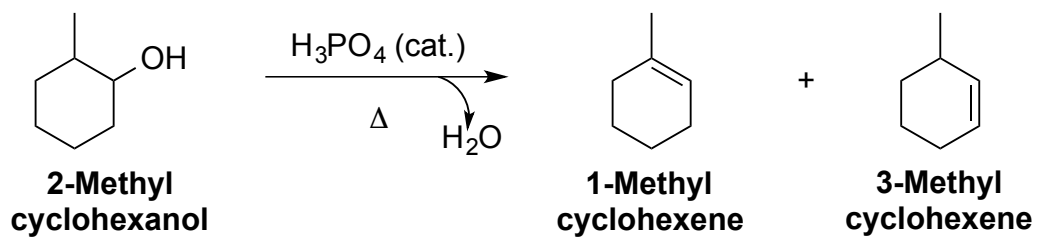


**CHEM 8L, Experiment 5 – Dehydration of Methylcyclohexanols**

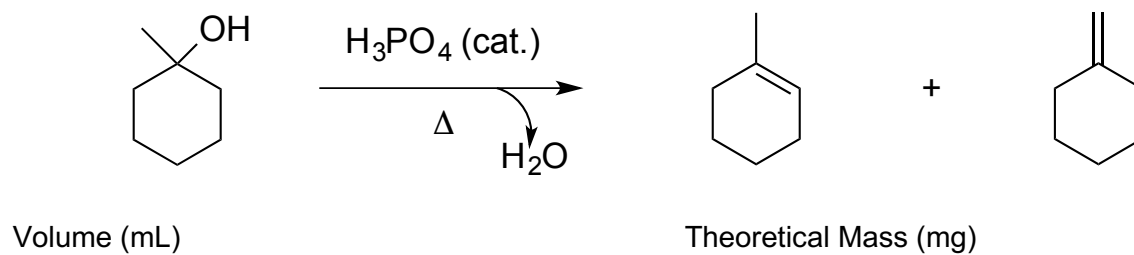
- Reaction Mechanism
- Zaitsev's Rule: product distribution
- Theoretical Yield Calculation
- Reaction Setup & Workup
- Analysis: (1) Percent Yield, (2) IR, (3) Chemical Tests, (4) GC

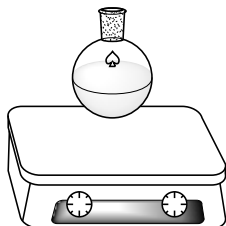
**Substitution vs. Elimination****Dehydration of Primary & Secondary Alcohols - Unimolecular Elimination (E1) Mechanism****Zaitsev's Rule:**Klein, *Organic Chemistry, 3rd ed.* Figure 7.13

The other methylcyclohexanol...

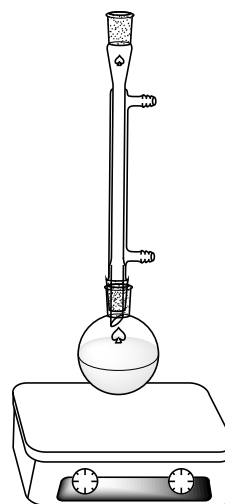


**Theoretical Yield:** how much product could be formed if 100% reacts and is collected?



Reaction Set-Up with Hickman Still

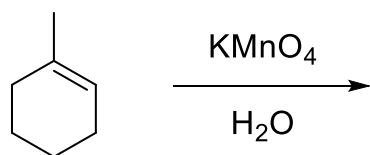
vs. Reflux Method

**Reaction Work-up = Dry the Product**

1. Transfer to test tube
2. Add anh.  $\text{Na}_2\text{SO}_4$
3. Wait 5 min
4. Filter pipet

**Analysis**

$$\% \text{ Yield} = \frac{\text{actual product mass}}{\text{theoretical mass}} \times 100\%$$

**Potassium Permanganate (KMnO<sub>4</sub>) Test**

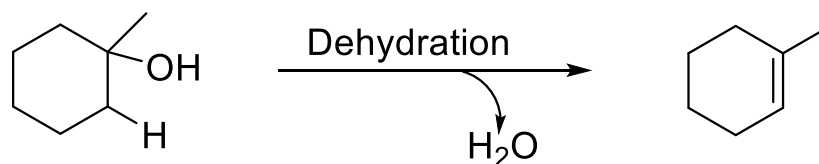
Test four samples

#1 – Product

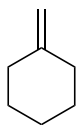
#2 – Cyclohexane

#3 – Cyclohexene

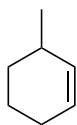
#4 Cyclohexanol

**IR Spectroscopy used to assess reaction success**

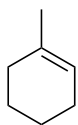
Great Success?? **Gas Chromatography (GC) analysis gives the final verdict!**



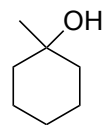
**methylene  
cyclohexane**  
102 °C



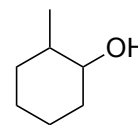
**3-methyl  
cyclohexene**  
104 °C



**1-methyl  
cyclohexene**  
110 °C



**1-methyl  
cyclohexanol**  
155 °C



**2-methyl  
cyclohexanol**  
163 °C

### GC Standards Provided

- Mixture of 1- and 3-Methylcyclohexene (1:1)

- 1-Methylcyclohexanol

- 2-Methylcyclohexanol

- **Reaction Mixture (assigned)**