PILOT

Problem Set 5

Organic Chemistry 1 (Greenberg)

Fall 2025

Roadmap:

- Reaction thermodynamics and kinetics definitions
- Carbocations and rearrangements (hydride, 1,2-methyl, and ring shifts)
- Markovnikov, Anti-Markovnikov, anti/syn reactions

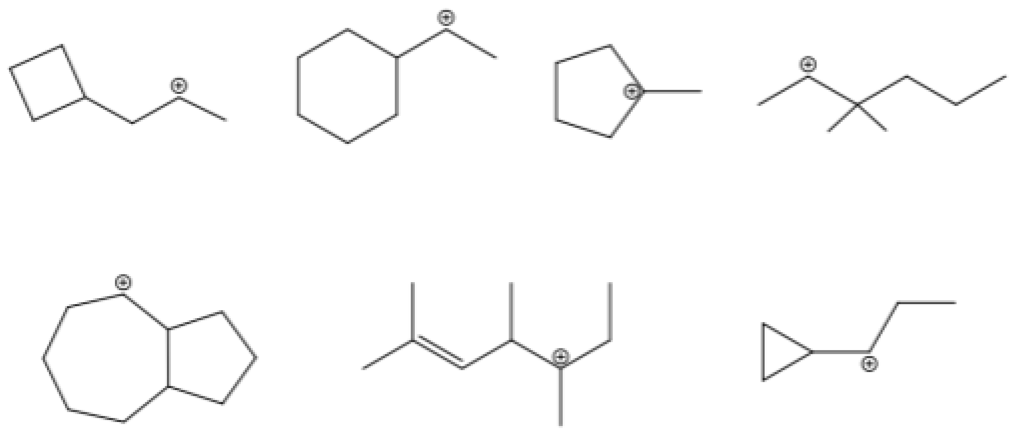
1. What is the difference between a thermodynamically favored reaction and a kinetically favored reaction?

   Thermodynamic reaction:

   Kinetic reaction:

2. Draw a reaction coordinate diagram for a one-step exergonic reaction and an endergonic reaction. Which is more favored for each reaction, the starting material(s) or the product(s)?

3. Some of the following compounds can undergo carbocation rearrangement(s)? Draw the <u>final</u> rearranged version (if applicable) and state the type of rearrangement(s) that occur.



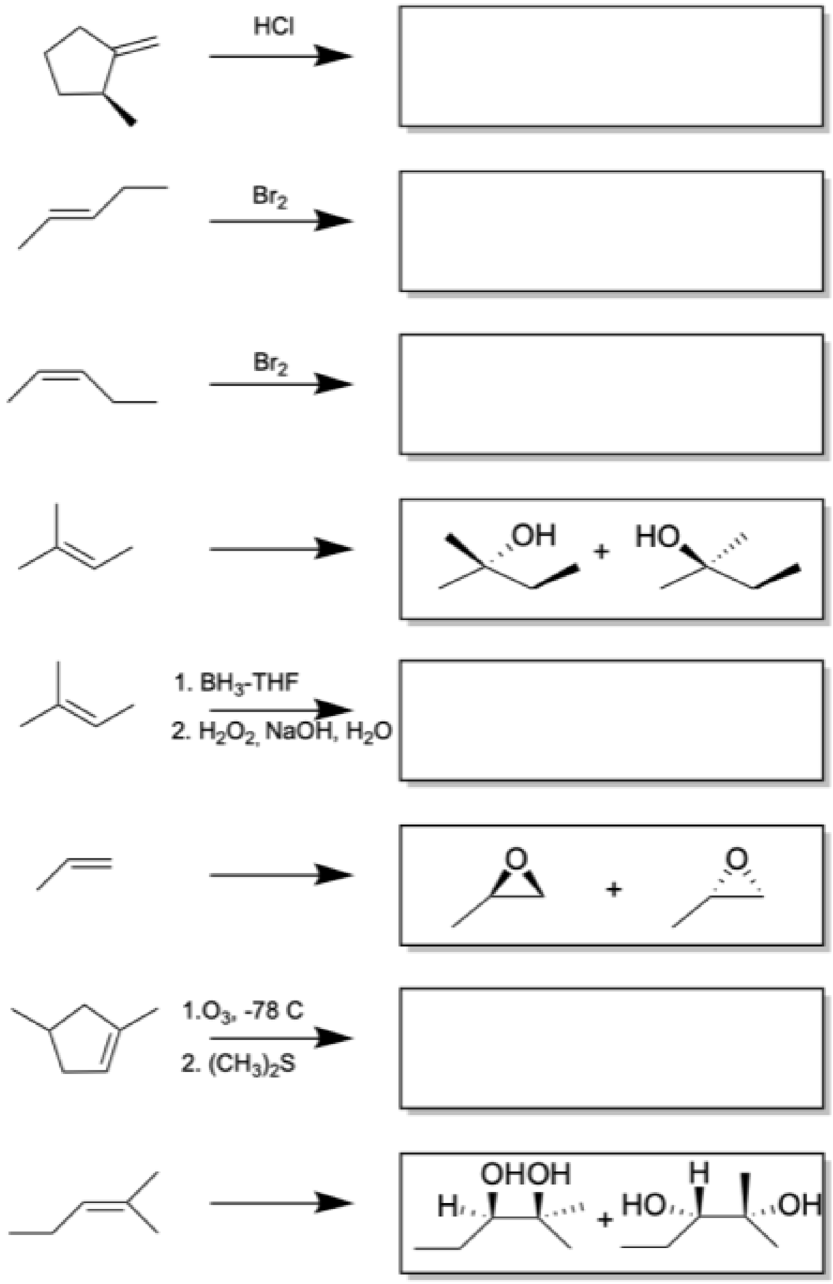
4. The starting material can undergo carbocation rearrangements to form more stable carbocation intermediates. Draw the most stable intermediate and identify the type of carbocation rearrangement that occurs. What is the driving force of this carbocation rearrangement?

5. For the table below, please indicate the reagents used (include steps if applicable), whether the reaction follows Markovnikov and syn/anti addition patterns, and the

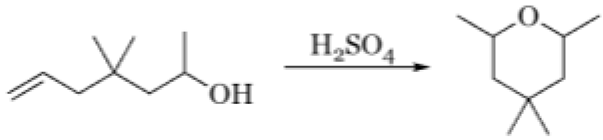
intermediate formed. Use bromine as the standard halogen and sulfuric acid as the standard acid if applicable.

Reaction	Reagents	Markovnikov	Syn/Anti Addition	Intermediate type
Hydrohalogenation				
Acid-Catalyzed Hydration or Alcohol Addition				
Halogenation				
Halohydrin Formation				
Hydroboration Oxidation				N/A
Catalytic Hydrogenation		N/A		N/A
Epoxidation		N/A		N/A
Ozonolysis		N/A	N/A	N/A
Dihydroxylation		N/A		N/A

6. Fill out the reactions either with reagents or products. Indicate the stereochemistry of the products if applicable and name their relationships.



7. Provide a mechanism (with mechanistic arrows) for the following reaction:



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HopTHON
Are you interested in raising money for children in need? We work with Johns Hopkins Children's Center under Children's Miracle Network of Hospitals to raise money for the families and children undergoing treatment! We have many fun ways to get involved and fundraising events throughout the year.

Tip of the Week:

Did you know that Hopkins has a planetary observatory right on Homewood campus? Every Friday night, the Maryland Space Grant Observatory, located on the roof of Bloomberg, hosts a free open house for the public after sunset, weather permitting. Check here for updates on hours and visibility status : https://md.spacegrant.org/observatory-open-house/.