

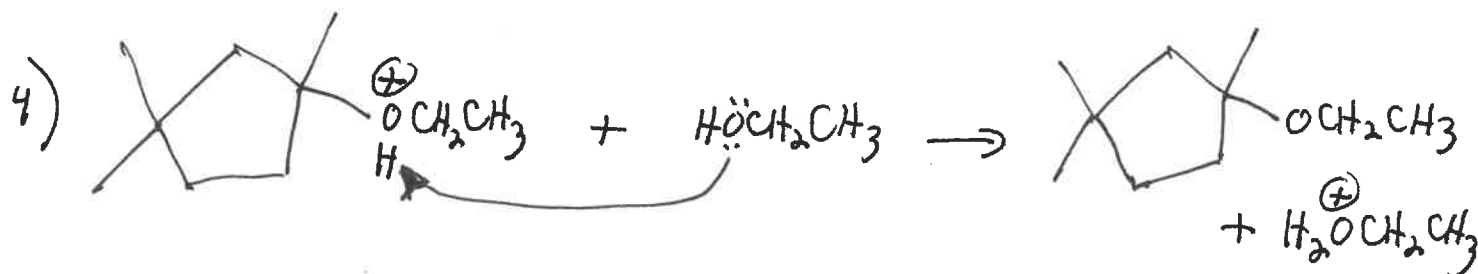
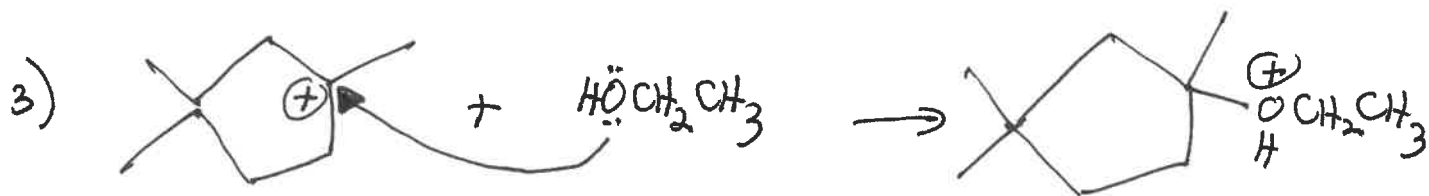
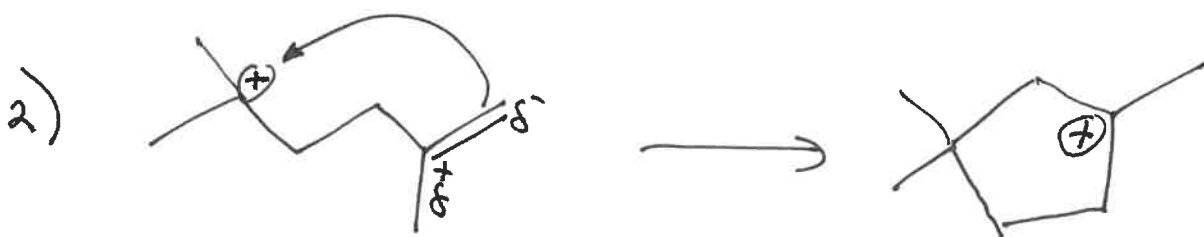
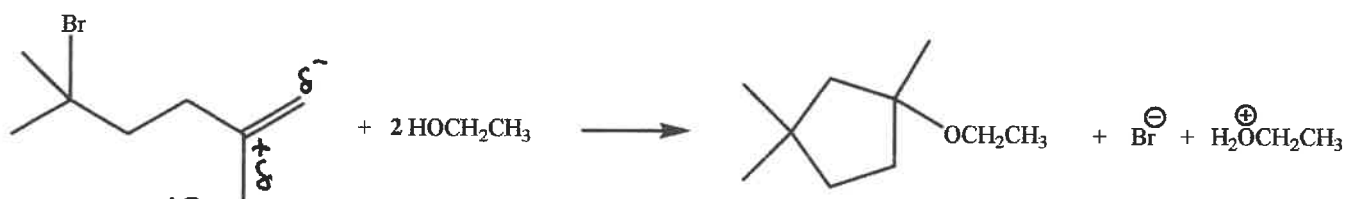
NAME (print) Answer Key

CHEM 244 - Organic Chemistry II

**Optional Mechanism Problem.** This optional problem is not worth any points, but is for some extra practice on mechanisms and critical thinking. **Intramolecular Electrophilic Addition to a Carbocation (4 steps).** Write a complete mechanism that explains the formation of all products for the balanced epoxide reaction shown below. Your mechanism must consist of a series of numbered, balanced chemical equations, and curved arrows to show electron pair movement.

The reasoning and steps in this mechanism are very similar to reactions we looked at in CHEM 243:

- Formation of a carbocation
- Intramolecular electrophilic addition of the partial negative alkene carbon to the carbocation, forming a ring and a new carbocation
- Addition of a nucleophile to the new carbocation
- Acid/Base neutralization step



(a) Explain why are there two molecules of alcohol?

one molecule of alcohol is used in step #3 as a nucleophile. The second molecule of alcohol is used as a base in step #4 to neutralize the product.

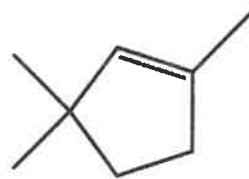
(b) Is  $\text{Br}^-$  a good leaving group? Explain.

$\text{Br}^-$  is a good LG as it is a weak base. It is the conjugate base of  $\text{HBr}$ , a strong acid.

(c) Why are there no carbocation rearrangements in this reaction?

The carbocations in steps #1 + #2 are both  $3^\circ$ , + stable.

(d) A small amount of the product at the right was also formed. Explain why, either in words, or by mechanism. HINT: Go back and look at your mechanism.



This alkene could be formed following step #2 of the mechanism above:

