

Homework for Chapter 8
Chem 2310

Name _____

I. Substitution, Addition, and Elimination Reactions

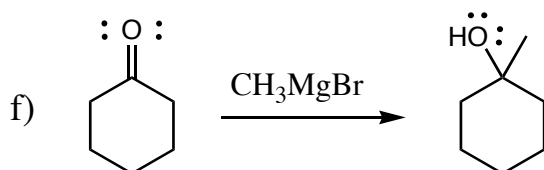
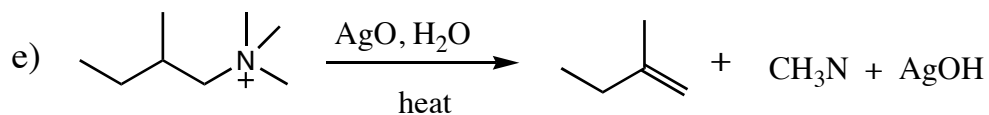
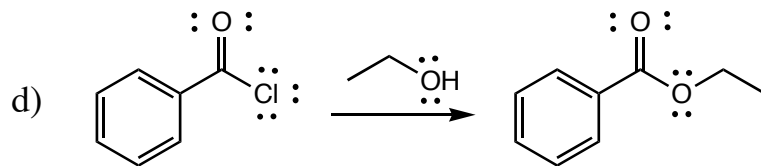
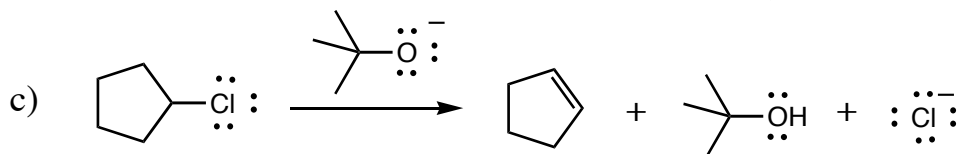
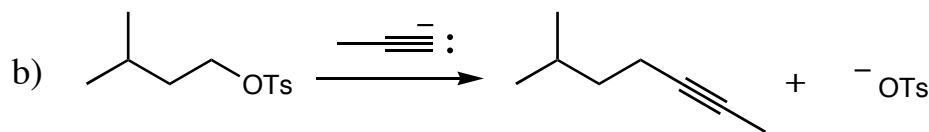
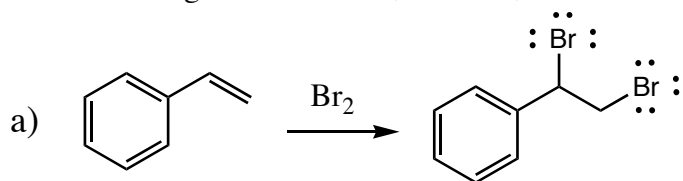
1. Briefly describe what happens in each of the following types of reactions.

a) elimination

b) addition

c) substitution

2. Label the following as substitution, addition, or elimination reactions.



II. Oxidation and Reduction Reactions

3. Give a definition of the terms below that apply to organic compounds.

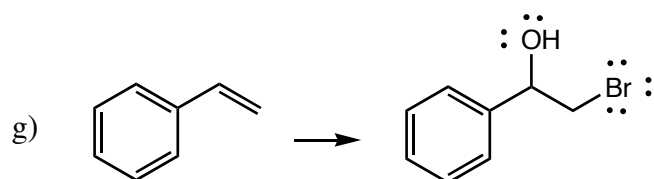
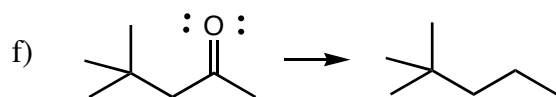
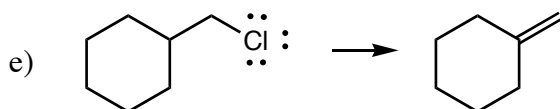
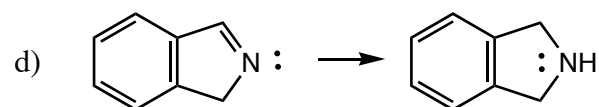
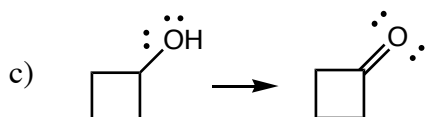
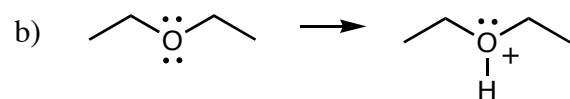
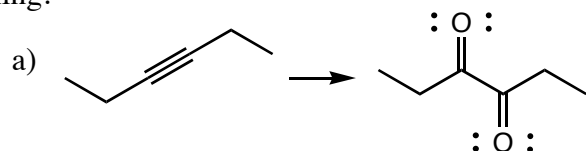
a) oxidation

b) reduction

c) oxidizing agent

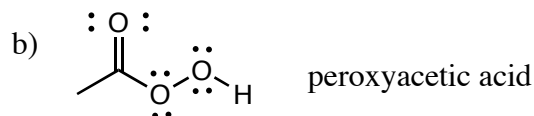
d) reducing agent

4. Label the following transformations as oxidation, reduction, or neither, and briefly explain your reasoning.



5. Label each of the following as oxidizing agents or reducing agents, and briefly explain your answer.

a) Raney nickel (includes H_2 , Ni)



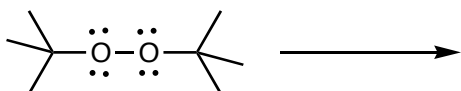
c) OsO_4 osmium tetroxide

d) $NaBH_3CN$ sodium cyanoborohydride

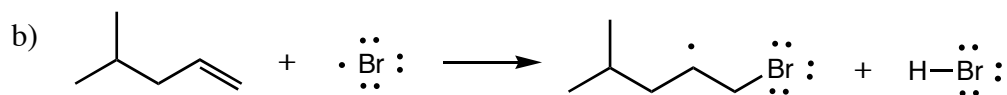
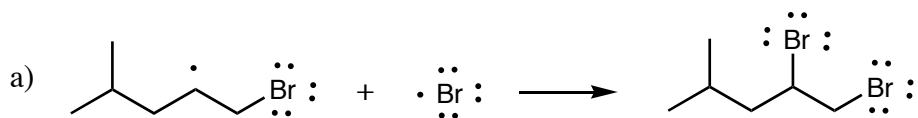
III. Radical Reactions

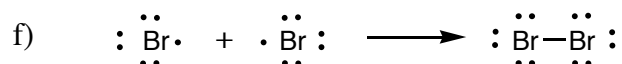
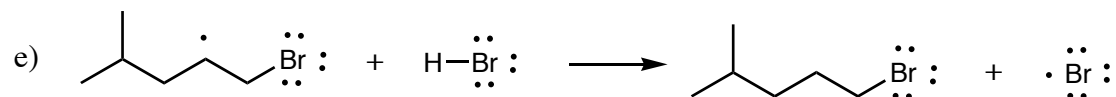
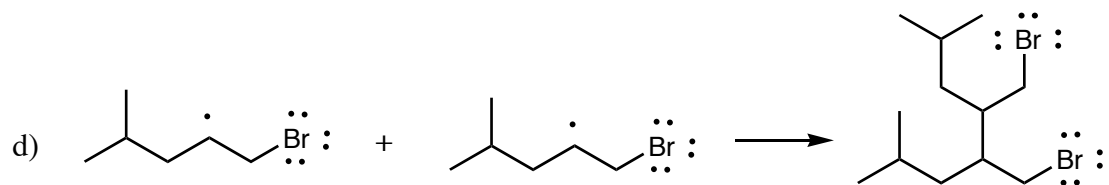
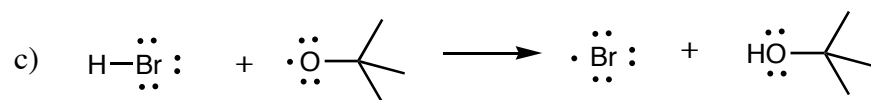
6. Draw an example of a radical, and explain why it is highly reactive.

7. Draw an initiation reaction with the following molecule, including the appropriate arrows. What is needed to make the reaction go? Why does this compound easily undergo initiation?



8. What type of radical reaction is represented by the following reactions? Draw in the appropriate arrows and label the reaction as an initiation, propagation, or termination step





9. The reaction steps in the last two problems are part of the mechanism for one reaction.

a) Write the overall reaction.

b) Which reagent is catalytic, and why?

c) Why aren't the products of the termination steps included in the overall reaction?

d) Will this reaction be a chain reaction? Explain.

e) Will this reaction stop at the product given, or will it go on to give a mixture of products?

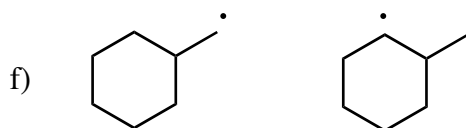
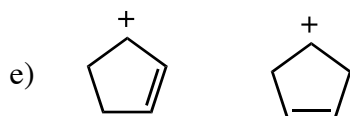
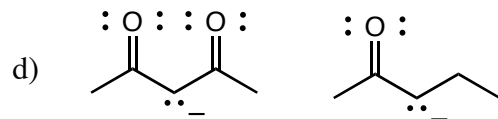
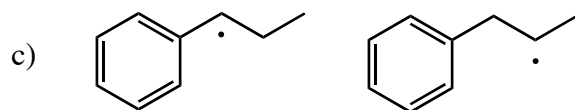
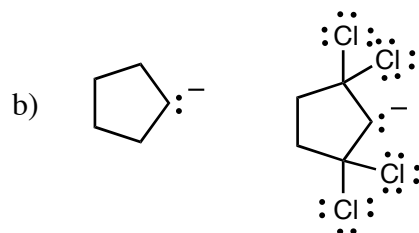
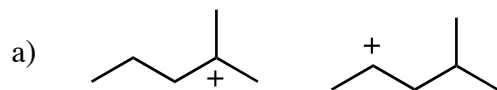
IV. Reactive Intermediates

10. Which reactive intermediates fit the descriptions below? Write in all that apply.

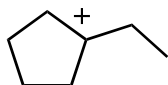
- a) sp^2 hybridized
- b) positive charge
- c) incomplete octet
- d) stabilized by hyperconjugation
- e) no charge
- f) unpaired electron
- g) formed by reaction with a base
- h) negative charge
- i) can react as nucleophiles
- j) trigonal pyramid geometry
- k) stabilized by resonance
- l) trigonal pyramid geometry
- m) lone pair of electrons
- n) bent geometry
- o) can react as acids
- p) stabilized by nearby electronegative atoms
- q) formed by dissociation
- r) have an empty orbital

11. Why are reactive intermediates important in organic reactions?

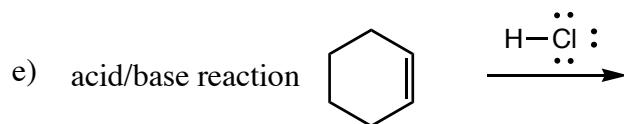
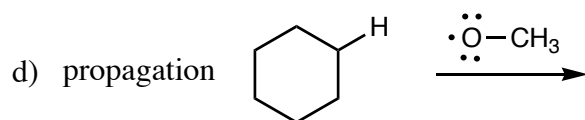
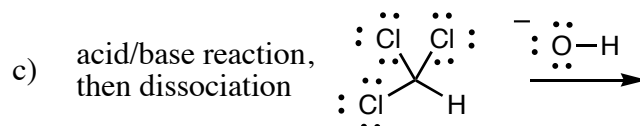
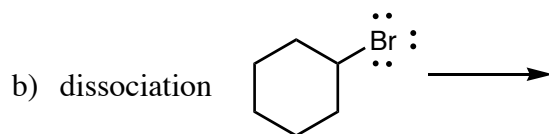
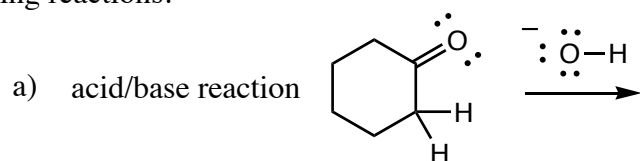
12. Circle the more stable intermediate in each pair, and explain your reasoning.



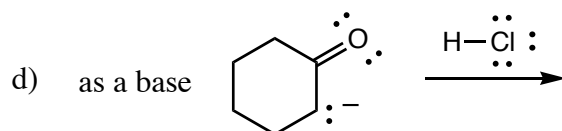
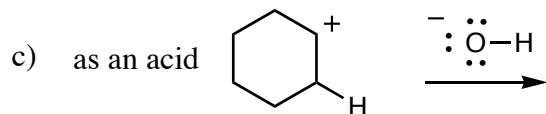
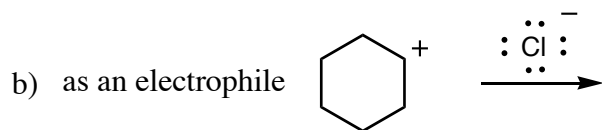
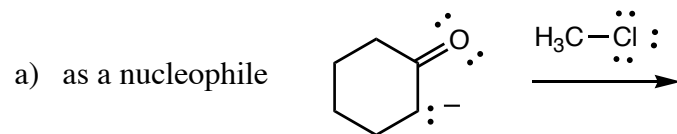
13. Explain how the carbocation below is stabilized by hyperconjugation, showing which orbitals overlap with the empty p orbital.

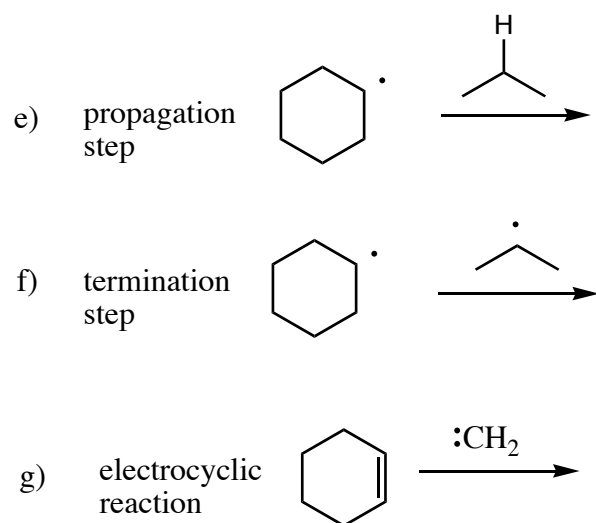


14. Draw the arrows to show how the electrons move and the intermediate that will be formed by the following reactions.

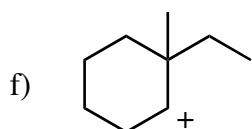
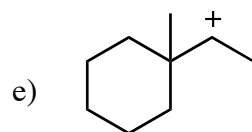
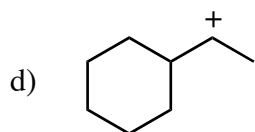
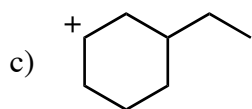
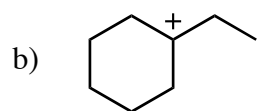
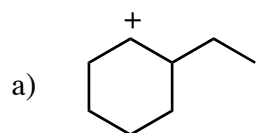


15. Each of the intermediates below will react as described. Draw the arrows to show how the electrons move, and the products of each reaction.





16. Indicate whether or not the following carbocations will undergo a rearrangement. If so, draw the new carbocation and an arrow showing how it was formed.



V. Stereochemistry of Reactions

17. What three things can happen to the stereochemistry of a stereocenter that is involved in a reaction (give a word and describe what it means)?

1)

2)

3)

18. What is the most common result of one new asymmetric carbon being created in a reaction?

19. What must be present in order for a stereoselective reaction to occur?

20. What three things can happen if two new asymmetric carbons are created in a reaction (give the name and what it means)?

1)

2)

3)

21. Identify what is happening to the stereochemistry in each of the following reactions using a brief description.

