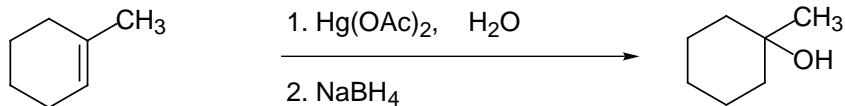


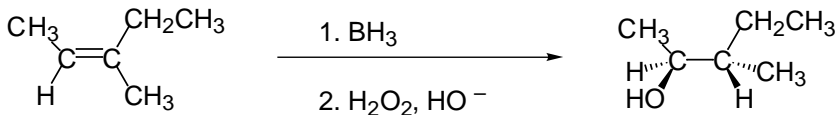
I. REACTIONS: Predict the major organic products of the following reactions.

INDICATE STEREOCHEMISTRY AS NEEDED. (4 points each)

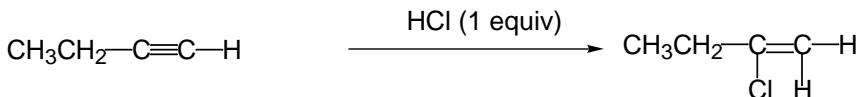
1.



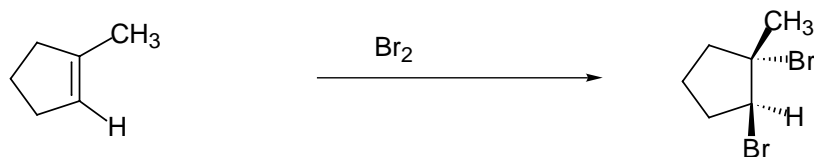
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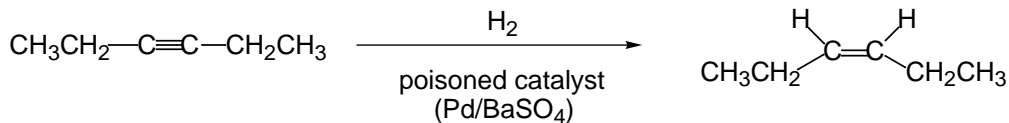
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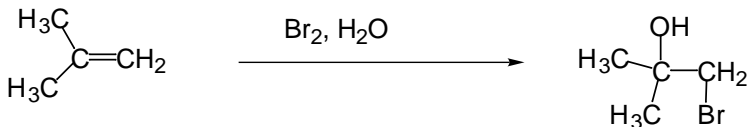
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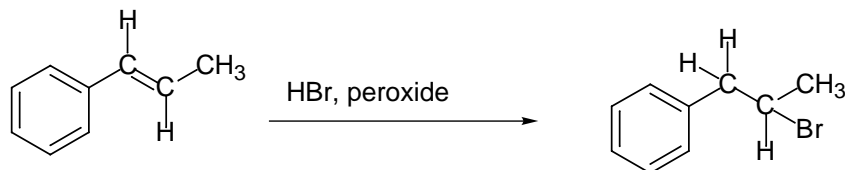
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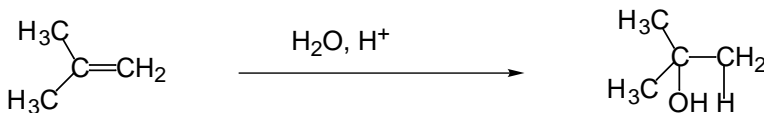
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7.



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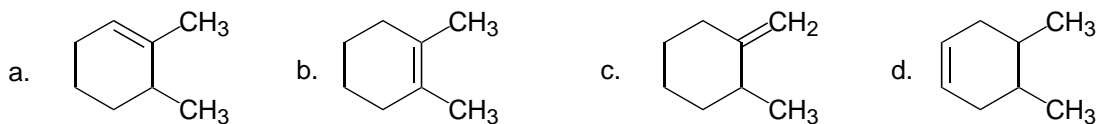
9.



II. Multiple Choice: Circle the best answer (**only one**). (3 points each)

10. Which of the following alkenes is the most stable?

B



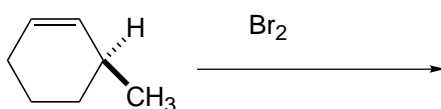
11. Which of the following is the least stable carbocation?

D

- a. $\text{H}_2\text{C}=\text{CHCH}_2^+$ c. $\text{C}_6\text{H}_5(\text{CH}_3)_2\text{C}^+$
b. $(\text{CH}_3)_3\text{C}^+$ d. CH_3CH_2^+

12. In the following reaction what is the relationship of the products formed?

D



- a. enantiomers c. structural isomers
b. meso compound d. diastereomers

13. The carbon-carbon triple bond of an alkyne is composed of _____

C

- a. two σ bonds and one π bond
b. three σ bonds
c. one σ bond and two π bonds
d. three π bonds

14. The free energy of reaction is

C

- a. the difference in energy between the reactants and an intermediate in the reaction
b. the difference in energy between the reactants and the transition state
c. the difference in energy between the reactants and the products
d. the difference in energy between the transition state and the products
e. the difference in energy between the intermediate and the products

15. What is the hybridization of the positively charged carbon in H_3C^+

B

- a. p c. sp e. d^2sp^3
b. sp^2 d. sp^3 f. s

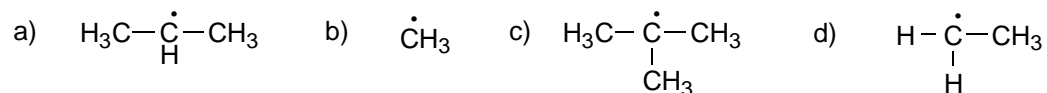
16. A secondary cation is more stable than a primary carbocation because of

B

- a. overlap of a filled p orbital with an adjacent σ^* antibonding orbital
b. overlap of an empty p orbital with adjacent σ bonding orbitals
c. resonance
d. deduction

17. Which of the following free radicals is the most stable?

C



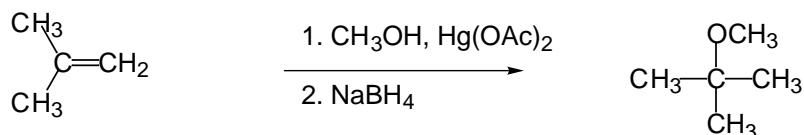
18. Which of the following is **not** true of $\text{H}_2\text{C}=\text{CH}_2$?

D

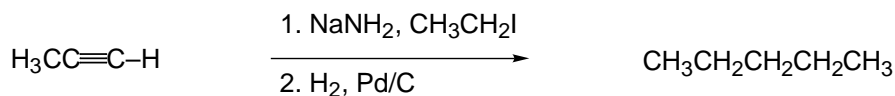
- a) It contains 5 σ bonds.
- b) It has bond angles of 120° .
- c) All the atoms are in the same plane.
- d) It has free rotation about the $\text{C}=\text{C}$ bond.

Syntheses: Give reagents to carry out the transformations below. (4 points each)

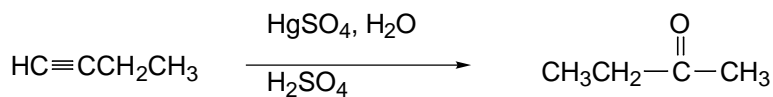
19.



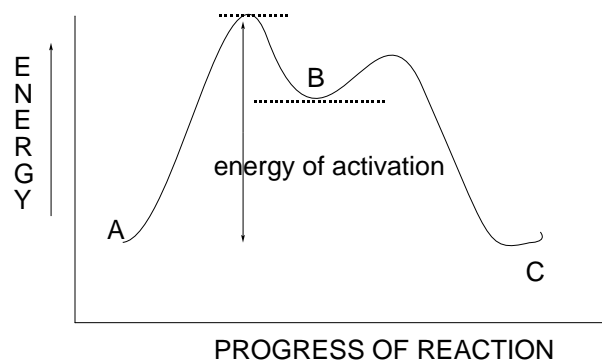
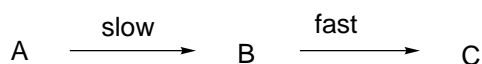
20.



21.



22. Draw an energy diagram for the hypothetical exergonic reaction below where B is an unstable intermediate. Label the positions for A, B, and C on the diagram and indicate the energy of activation on the diagram. (5 points).



26.

