

Pledge: I have neither given nor received aid on this exam.

Signature _____

I. Multiple Choice: Place the letter in the blank and Circle the best answer (**only one**). (4 points each)

__B_1. The rate limiting step for free radical halogenation is

- a. initiation
- b. hydrogen atom abstraction from carbon by the halogen radical
- c. attack of carbon radical on molecular halogen
- d. termination

__F_2. Which of the following are "concerted" reactions?

- a. S_N1
- b. S_N2
- c. E1
- d. E2
- e. S_N1 and E1
- f. S_N2 and E2

__B_3. Reaction of a strong base with a tertiary alkyl halide is most likely to result in:

- a. no reaction
- b. E2 elimination
- c. S_N1 substitution
- d. E1 elimination

__B_4. Which of the following statements is correct?

- a. Free radical bromination is more selective than chlorination because the transition state is more reactant-like.
- b. Free radical bromination is more selective than chlorination because the transition state is more product-like.
- c. Free radical chlorination is more selective than bromination because the transition state is more product-like.
- d. Free radical chlorination is more selective than bromination because the transition state is more reactant-like.

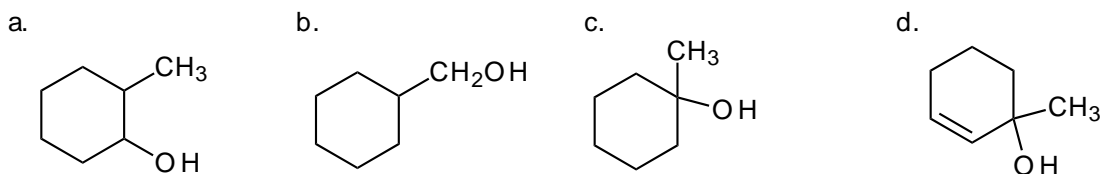
__B_5. Which of the following species is the most nucleophilic?

- a. NH_3
- b. H_3P
- c. H_2S
- d. H_2O

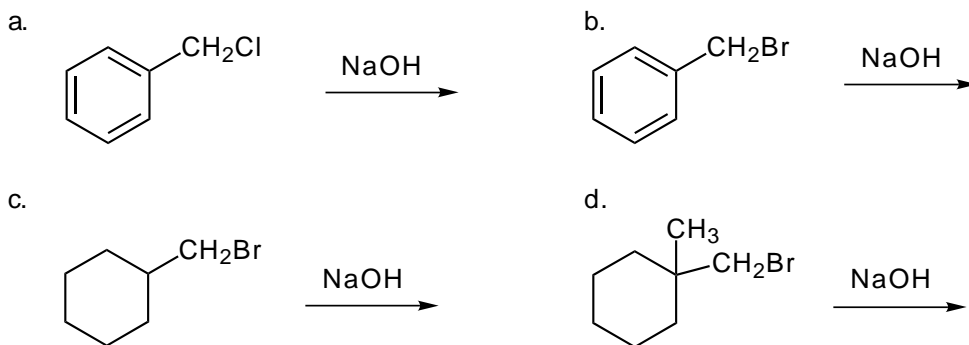
__C_6. S_N1 reactions lead to

- a. formation of free radicals
- b. retention of stereochemistry
- c. racemization
- d. inversion of stereochemistry

__D__7. Which of the following would undergo the fastest dehydration reaction in the presence of acid?

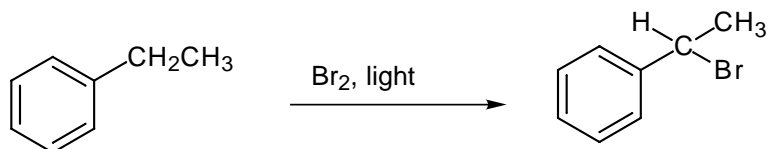


__B_8. Which of the following reactions will proceed the fastest?

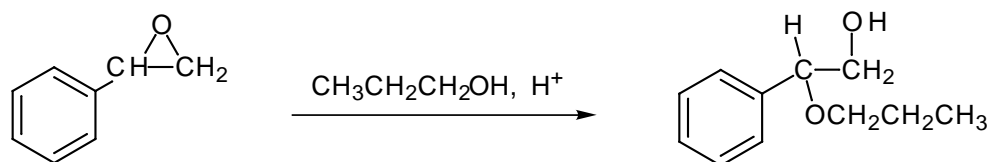


II. REACTIONS: Predict the major organic products of the following reactions. **INDICATE STEREOCHEMISTRY AS NEEDED.** (4 points each)

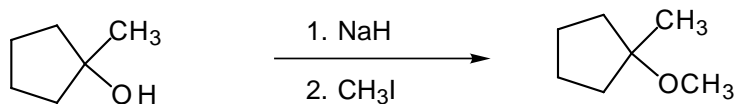
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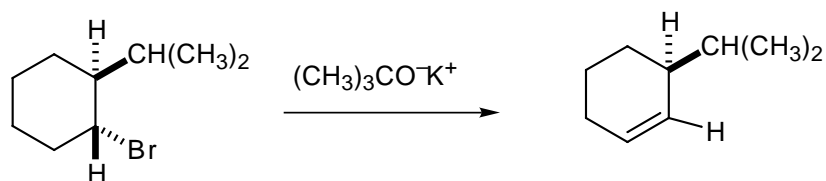
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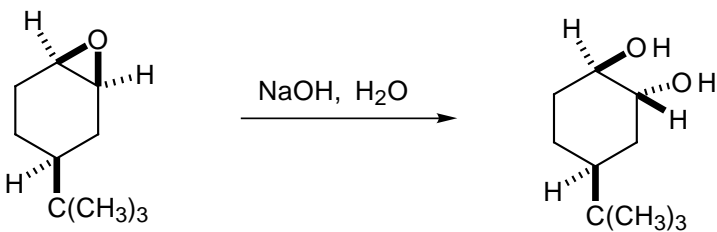
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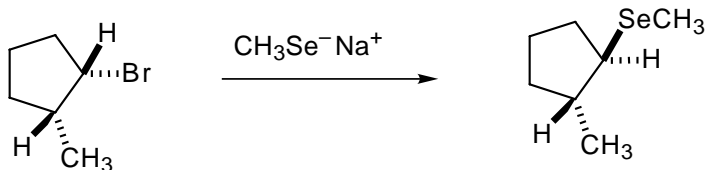
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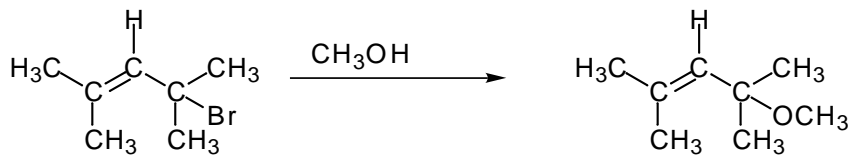
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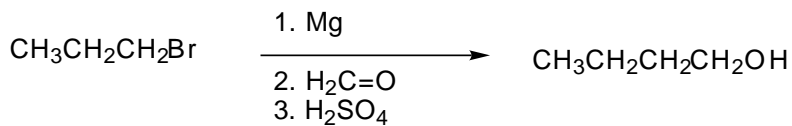
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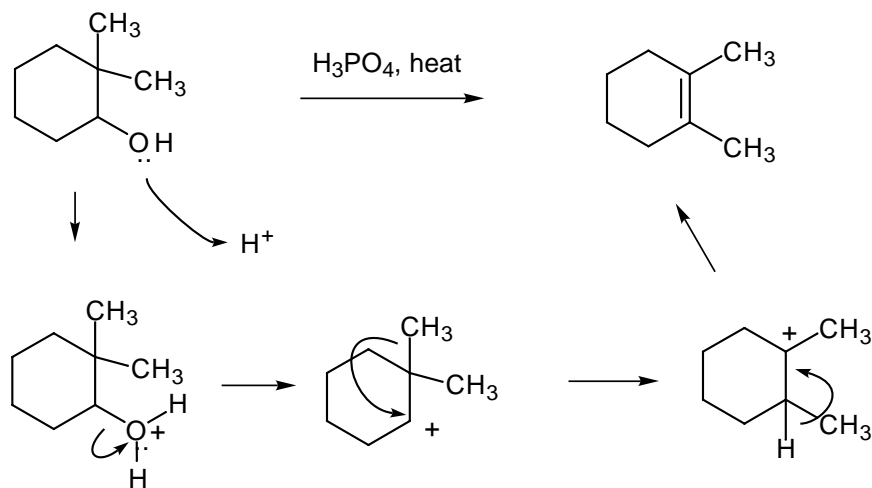


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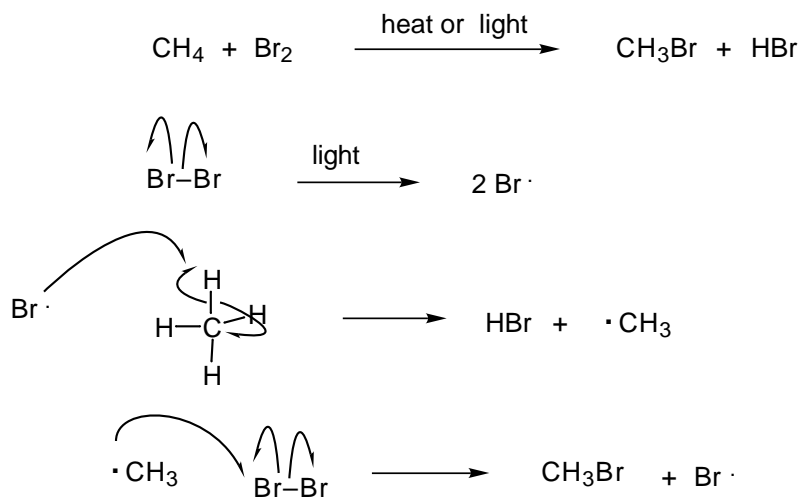


V. Mechanisms. Give a stepwise, detailed mechanism with arrows and intermediates for the following reactions. Be sure to account for stereochemistry as needed. (6 points each)

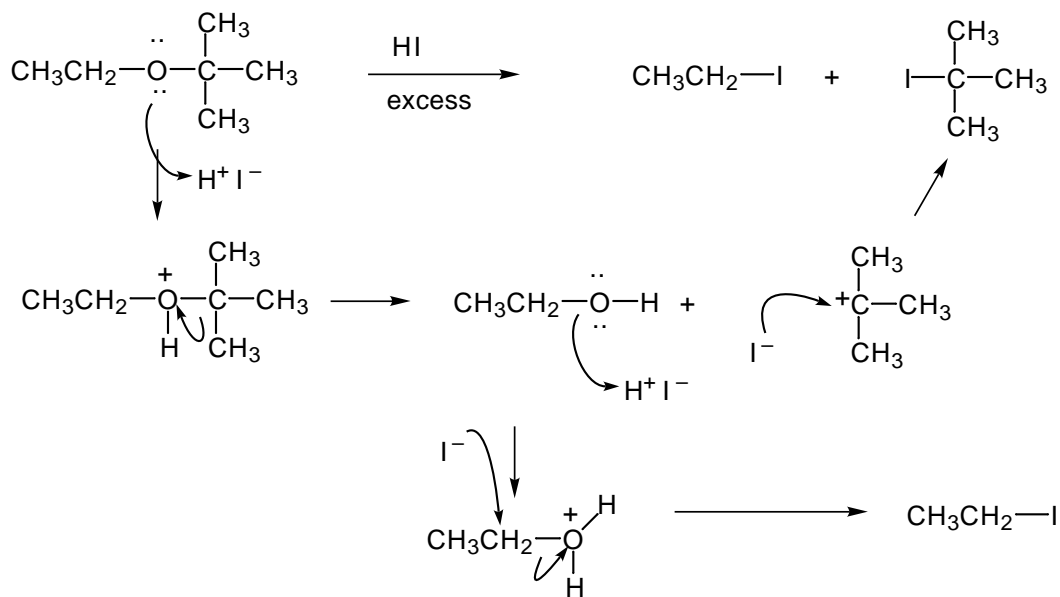
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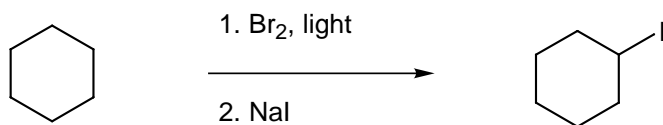


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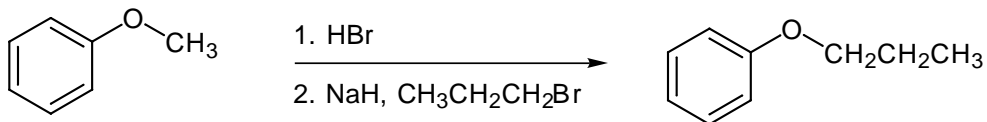


Syntheses: Give reagents to carry out the transformations below. (5 points each)

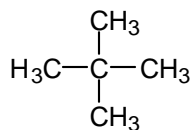
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21.



22. Only one monochlorination product is obtained from an alkane with the molecular formula C_5H_{12} . What is the structure of the alkane? (4 points)



23. Draw the transition state for the reaction of CH_3Br with HO^- . (4 points)

