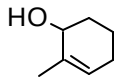
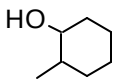
1. Treating 1-methylcyclohexene with H_3O^+ would yield primarily which of these?



I



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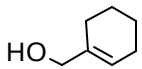

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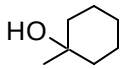

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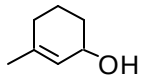
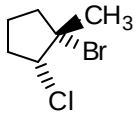


V

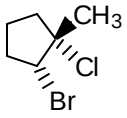
A) I and V
B) II
C) III and V
D) IV
E) I, III and V

2. The reaction of BrCl (bromine monochloride) with 1-methylcyclopentene will produce as the predominant product:



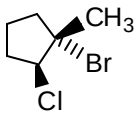
+ enantiomer

I



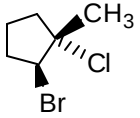
+ enantiomer

II



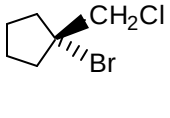
+ enantiomer

III



+ enantiomer

IV

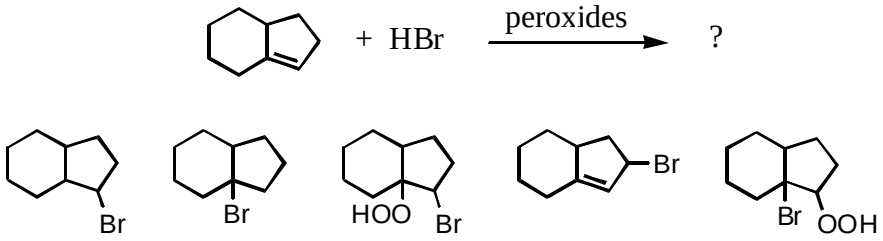


+ enantiomer

V

A) I
B) II
C) III
D) IV
E) V

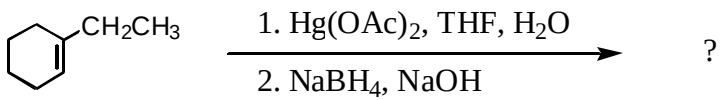
3. What product would result from the following reaction?

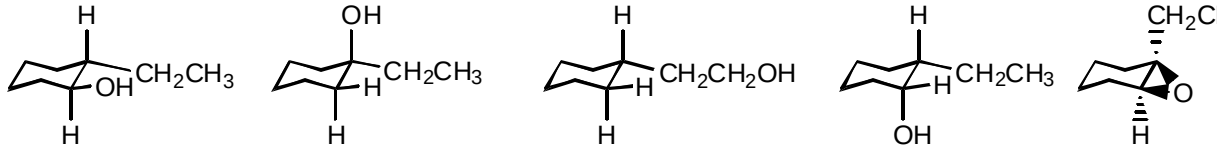


I II III IV V

A) I
B) II
C) III
D) IV
E) V

4. Which would be the major product of the reaction shown?



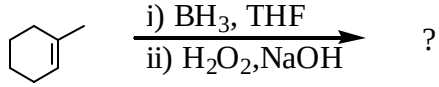


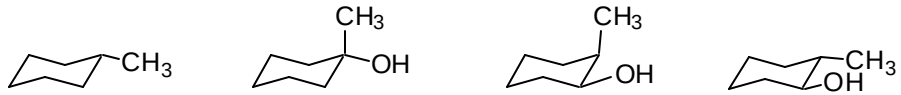
I II III IV V

A) I
B) II

C) III
D) IV
E) V

5. What is the major product of the reaction:



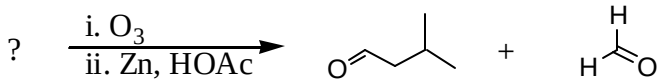


\+ enantiomer + enantiomer

I II III IV

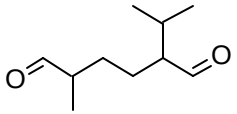
A) I
B) II
C) III
D) IV
E) Both III and IV

6. Which substance would undergo the following reaction?

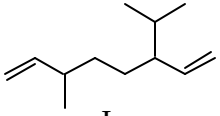


A) 4-Hexen-1-yne
B) 3-methyl-1-hexene
C) *(E)*-2-hexene
D) *(Z)*-2-hexene
E) 4-methyl-1-pentene

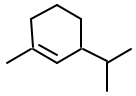
7. An alkene with the molecular formula $C_{10}H_{18}$ is treated with ozone and then with zinc and acetic acid. The product isolated from these reactions is:



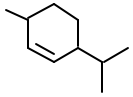
What is the structure of the alkene?



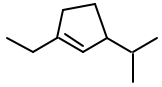
I



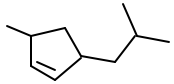
II



III



IV



V

A) I
B) II
C) III
D) IV
E) V

8. Hydrogen atom abstraction from which position would yield the most stable free radical intermediate during the reaction of bromine with 2,2,3-trimethylpentane?
A) C1
B) C2
C) C3
D) C4
E) C5

9. Which of the following gas-phase reactions is a possible chain-terminating step in the light-initiated chlorination of methane?

A) $Cl–Cl \longrightarrow 2Cl\cdot$

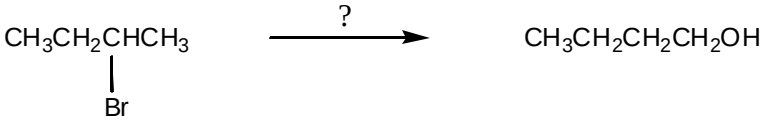
B) $Cl\cdot + CH_4 \longrightarrow CH_3\cdot + H–Cl$

C) $CH_3\cdot + CH_3\cdot \longrightarrow CH_3–CH_3$

D) $CH_3\cdot + Cl–Cl \longrightarrow CH_3Cl + Cl\cdot$

E) $H^- + CH_3Cl \longrightarrow CH_4 + Cl^-$

10. Which would be the best way to carry out the following synthesis?



A) (1) HA, heat; (2) H_3O^+, H_2O, heat

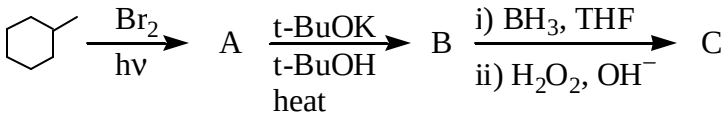
B) (1) $(CH_3)_3COK$ / $(CH_3)_3COH$; (2) BH_3:THF, then H_2O_2, OH^-

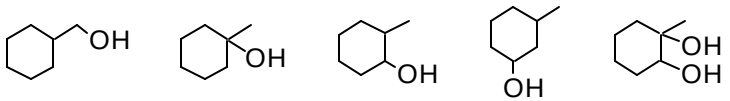
C) (1) $(CH_3)_3COK$ / $(CH_3)_3COH$; (2) H_3O^+, then H_2O, heat

D) (1) KOH, C_2H_5OH; (2) BH_3:THF, then H_2O_2, OH^-

E) (1) KOH, C_2H_5OH; (2) HA, heat; (3) H_3O^+, H_2O, heat

11. What is the final product, **C**, obtained via the following reaction sequence?



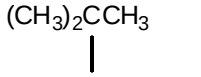


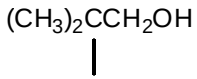
I II III IV V

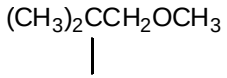
A) I
B) II
C) III
D) IV
E) V

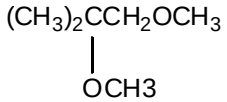
12 What would be the final product?

A) $(CH_3)_2CHCH_2OCH_3$

B) 

C) 

D) 

E) 

13. Which method would provide the best synthesis of ethyl isopropyl ether?

A) $(CH_3)_2CHONa + CH_3CH_2Br \longrightarrow$

B) $CH_3CH_2ONa + (CH_3)_2CHBr \longrightarrow$

C) $CH_3CH_2OH + (CH_3)_2CHOH \xrightarrow{H_2SO_4,\ 140\ ^oC}$

D) $CH_3CH_2OH + (CH_3)_2CHOH \xrightarrow{H_2SO_4,\ 180\ ^oC}$

E) $CH_3CH_2ONa + (CH_3)_2CHOH \longrightarrow$

14. The following reaction,

$$CH_3CH_2CH_2CH_2OH \xrightarrow[heat]{HBr} CH_3CH_2CH_2CH_2Br + H_2O$$

is probably:

A) An S_N1-type reaction involving the protonated alcohol as the substrate.
B) An S_N2-type reaction involving the protonated alcohol as the substrate.
C) An E1-type reaction involving the protonated alcohol as the substrate.
D) An E2-type reaction involving the protonated alcohol as the substrate.
E) An epoxidation reaction.

15. (R)-3-Chloro-1-butene reacts with HCl by Markovnikov addition, and the products are separated by gas chromatography. How many total fractions would be obtained and how many would be optically active?

A) One optically active fraction only
B) One optically active fraction and one optically inactive
C) Two optically active fractions
D) One optically active fraction and two optically inactive
E) Two optically active fractions and one optically inactive

Answers

1. D
2. D
3. A
4. B
5. D
6. E
7. C
8. C
9. C
10. B
11. A
12. C
13. A
14. B
15. B