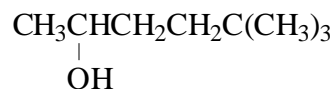


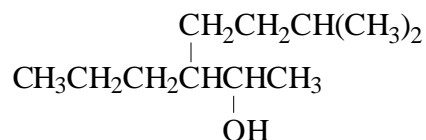
Chapter 4: Alcohols & Alkyl Halides

4-1 What is the IUPAC name of the compound below?



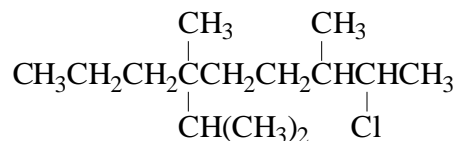
- 1) 5,5-dimethyl-2-hexanol 3) 5,5-dimethyl-2-pentanol
2) 2,2-dimethyl-5-hexanol 4) 2,2-dimethyl-5-pentanol

4-2 What is the IUPAC name of the compound below?



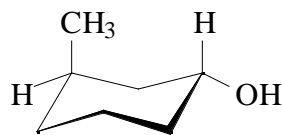
- 1) 3-isobutyl-2-hexanol 3) 2-methyl-5-propyl-6-heptanol
2) 2-methyl-5-(1-hydroxyethyl)octane 4) 6-methyl-3-propyl-2-heptanol

4-3 What is the IUPAC name of the compound below?



- 1) 8-chloro-4-isopropyl-4,7-dimethylnonane
2) 2-chloro-6-isopropyl-3,6-dimethylnonane
3) 2-chloro-3,6,7-trimethyl-6-propyloctane
4) 6-*sec*-butyl-2-chloro-3,6-dimethyloctane

4-4 What is the IUPAC name of the following compound?



- 1) *cis*-3-methylcyclohexanol 3) *cis*-5-methylcyclohexanol
2) *trans*-3-methylcyclohexanol 4) *trans*-5-methylcyclohexanol

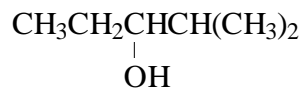
4-5 Which of the following is isobutyl alcohol?

- 1) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$ 3) $(\text{CH}_3)_2\text{CHCH}_2\text{OH}$
2) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}_3$ 4) $(\text{CH}_3)_3\text{COH}$

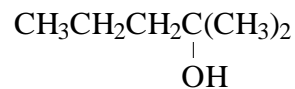
4-6 Identify the tertiary alcohol(s).



A



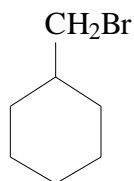
B



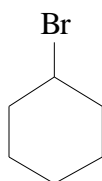
C

- 1) only A 2) only B (3) only C 4) both A and C

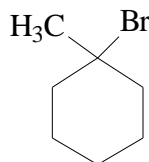
4-7 Identify the tertiary halide(s).



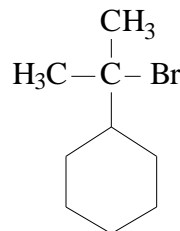
A



B



C



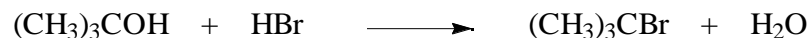
D

- 1) A and B 2) B and C (3) C and D 4) only D

4-8 What is the hybridization of the oxygen atom in alcohols?

- 1) sp 2) sp² 3) sp² (4) sp³

4-9 What is the nucleophile in the following substitution reaction?



- 1) (CH₃)₃COH 2) (CH₃)₃C⁺ (3) Br⁻ 4) H⁺

4-10 The C O H bond angle in alcohols is closest to:

- 1) 90° (2) 109° 3) 120° 4) 180°

4-11 Which of the following is the conjugate acid of ethanol?

- 1) CH₃CH₂O⁻ 2) CH₃CH₂O⁺ (3) CH₃CH₂OH₂⁺ 4) CH₃CH₂OH₃⁺

4-12 What are the products of the following reaction?



- (1) 1-bromobutane and water 3) butane and HOBr
2) 1-bromobutane and hydrogen 4) CH₃CH₂CH₂CH₂OBr + hydrogen

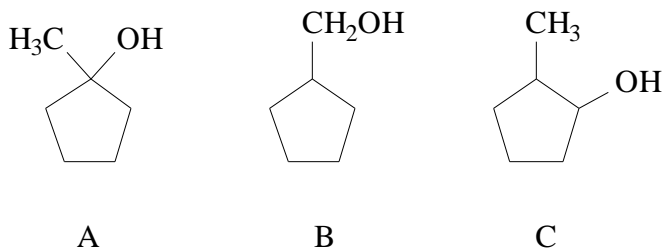
4-13 Which of the following is not a good method to make bromocyclopentane?

- 1) cyclopentanol plus HBr 3) cyclopentanol plus PBr₃
2) cyclopentanol plus NaBr 4) cyclopentane plus Br₂ with light

4-14 Which of the following is most reactive with HBr?

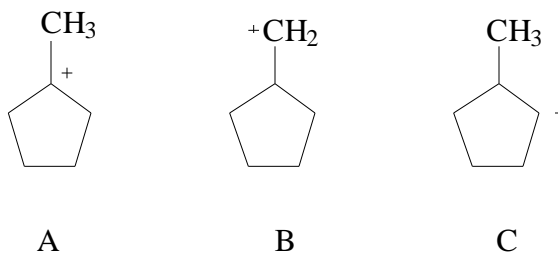
- 1) CH₃OH 3) (CH₃)₂CHOH
2) CH₃CH₂OH 4) (CH₃)₃COH

4-15 Arrange the following alcohols in order of their decreasing reactivity with HBr (most reactive first).



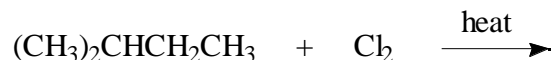
- 1) A>B>C 2) A>C>B 3) C>A>B 4) B>C>A

4-16 Arrange the following carbocations in order of their decreasing stabilities (most stable first).



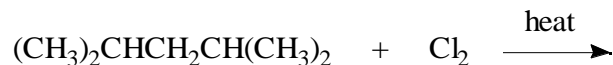
- 1) A>B>C 2) C>B>A 3) A>C>B 4) B>C>A

4-17 How many monochlorination products do you expect in the following reaction?



- 1) one 2) two 3) three 4) four 5) five

4-18 How many monochlorination products do you expect in the following reaction?



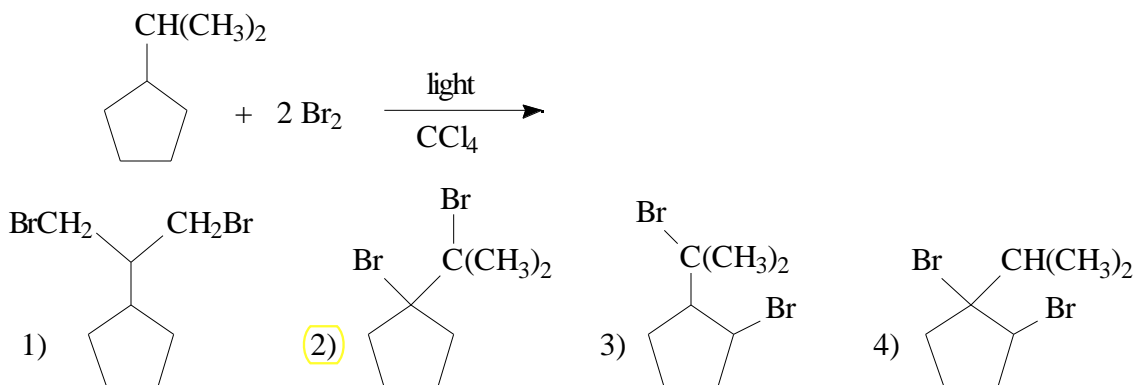
- 1) one 2) two 3) three 4) four 5) five

4-19 Which of the following is the most stable radical?

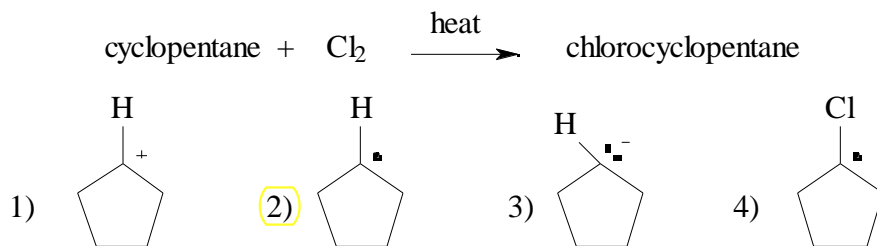
4-25 Studies indicate that the methyl radical is trigonal planar. Based on this, which of the following best describes the methyl radical?

- 1) The carbon is sp^2 hybridized and the unpaired electron occupies an sp^2 orbital.
- 2) The carbon is sp^2 hybridized and the unpaired electron occupies a $2p$ orbital.
- 3) The carbon is sp^3 hybridized and the unpaired electron occupies an sp^3 orbital.
- 4) The carbon is sp^3 hybridized and the unpaired electron occupies a $2p$ orbital.

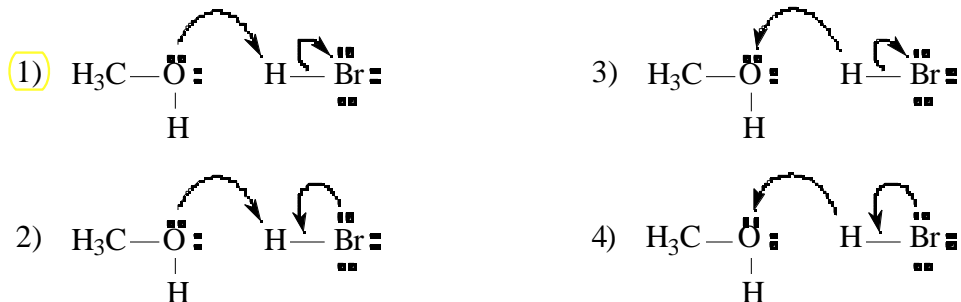
4-26 Dibromination of isopropylcyclopentane gives a product which can be isolated in good yields. Which of the following would you predict to be this product?



4-27 Which of the following is the key intermediate in the chlorination reaction below?



4-28 Which of the following correctly depicts the protonation of methanol by hydrogen bromide?

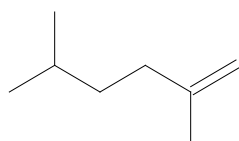


Chapter 5: Alkenes & Elimination Reactions

5-1 Carbon-carbon double bonds do not freely rotate like carbon-carbon single bonds. Why?

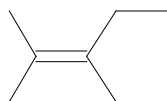
- 1) The double bond is much stronger and thus more difficult to rotate.
- 2) Overlap of the two 2p orbitals of the bond would be lost.
- 3) The shorter bond length of the double bond makes it more difficult for the attached groups to pass each other.
- 4) Overlap of the sp^2 orbitals of the carbon-carbon bond would be lost.

5-2 What is the IUPAC name of the following compound?



- 1) 2,5-dimethyl-1-hexene
- 2) 2,5-dimethyl-2-hexene
- 3) 1,4-dimethyl-1-hexene
- 4) 2,5-dimethyl-5-hexene

5-3 What is the IUPAC name of the following compound?



- 1) 2-methyl-3-propyl-2-pentene
- 2) 3-ethyl-2-methyl-2-hexene
- 3) 4-ethyl-5-methyl-4-hexene
- 4) 4-methyl-3-propyl-3-pentene

5-4 What is the IUPAC name of the following compound?



- 1) 3-ethyl-8-methyl-3-nonene
- 2) 7-ethyl-2-methyl-6-nonene
- 3) 1,1-diethyl-6-methyl-3-heptene
- 4) 3-ethyl-7-isopropyl-3-octene

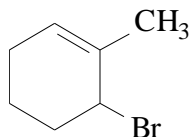
5-5 How many isomeric alkenes of formula C_4H_8 , including stereoisomers, are possible?

- 1) one
- 2) two
- 3) three
- 4) four
- 5) five

5-6 How many isomeric alkenes of formula C_5H_{10} , including stereoisomers, are possible?

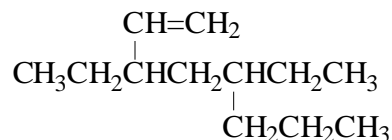
- 1) three
- 2) four
- 3) five
- 4) six
- 5) seven

5-7 What is the IUPAC name of the following compound?



- 1) 3-bromo-2-methylcyclohexene 3) 6-bromo-1-methylcyclohexene
2) 1-bromo-2-methyl-2-cyclohexene 4) 2-bromo-1-methylcyclohexene

5-8 What is the IUPAC name of the following compound?



- 1) 3-ethyl-5-propyl-1-heptene 3) 4,6-diethyl-1-octene
2) 5-ethyl-3-vinyloctane 4) 3,5-diethyl-1-octene

5-9 Which of the following alkenes exhibit E-Z isomerism?

- A. $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_3$ C. $\text{CH}_3\text{CH}_2\text{CH}=\text{CHBr}$
B. $(\text{CH}_3)_2\text{C}=\text{CHCH}_3$ D. $\text{H}_2\text{C}=\text{CHCH}_2\text{CH}(\text{CH}_3)_2$

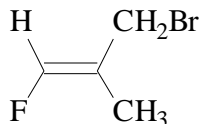
- 1) A and B 2) A and C 3) B and D 4) A, B, and C

5-10 Which of the following alkenes exhibit E-Z isomerism?

- A. 1-chloropropene B. 2-chloropropene C. 3-chloropropene

- 1) only A 2) A and B 3) B and C 4) A and C

5-11 What is the IUPAC name of the following compound?

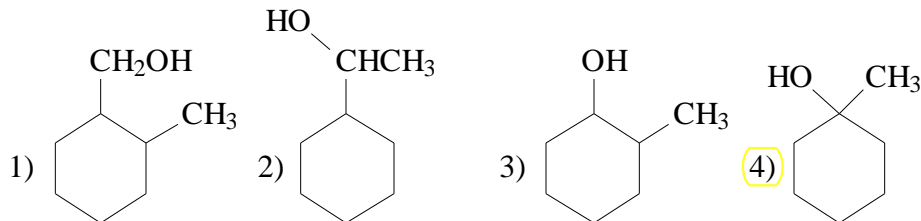


- 1) (E)-3-bromo-1-fluoro-2-methylpropene
2) (Z)-3-bromo-1-fluoro-2-methylpropene
3) (E)-1-bromo-3-fluoro-2-methylpropene
4) (Z)-1-bromo-3-fluoro-2-methylpropene

5-12 Identify the major organic product expected from the acid-catalyzed dehydration of 2-methyl-2-pentanol.

- 1) 2-methyl-1-pentene 3) 3-methyl-1-pentene
 2) 2-methyl-2-pentene 4) *cis*-3-methyl-2-pentene

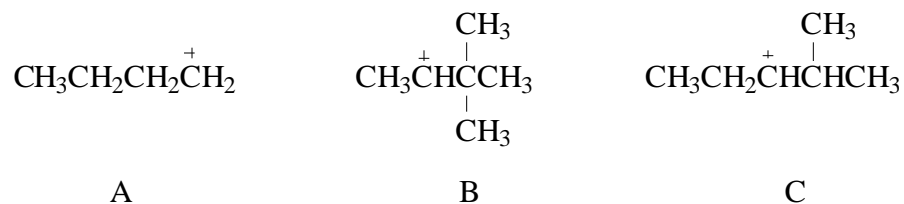
5-13 Which alcohol below would undergo acid-catalyzed dehydration most readily?



5-14 What is the slow, rate-determining step, in the acid-catalyzed dehydration of 2-methyl-2-propanol?

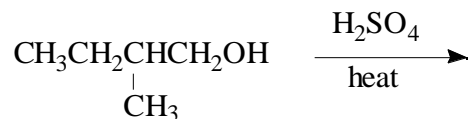


- 1) Protonation of the alcohol to form an oxonium ion.
 2) Loss of water from the oxonium ion to form a carbocation.
 3) Loss of a β -hydrogen from the carbocation to form an alkene.
 4) The simultaneous loss of a β -hydrogen and water from the oxonium ion.
- 5-15 Which of the following carbocations is(are) likely to undergo a rearrangement?



- 1) only A 2) A and C 3) B and C 4) A, B, and C

5-16 Predict the major product of the following reaction:



- 1) $\text{CH}_3\text{CH}_2\overset{\text{CH}_3}{\text{C}}=\text{CH}_2$ 3) $\text{CH}_3\text{CH}=\text{C}(\text{CH}_3)_2$
 2) $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_3$ 4) $(\text{CH}_3)_2\text{CHCH}=\text{CH}_2$

5-17 Which of the following expressions is the experimentally observed rate law for an E2 reaction of an alkyl halide?

1) rate = $k[\text{RX}]$

3) rate = $k[\text{RX}]^2$

2) rate = $k[\text{RX}][\text{base}]$

4) rate = $k[\text{base}]$

Disregard this question.

Which most readily undergoes an E2 reaction with sodium ethoxide (NaOEt)?

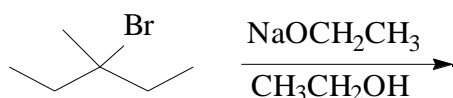
1) *tert*-butyl fluoride

3) *tert*-butyl bromide

2) *tert*-butyl chloride

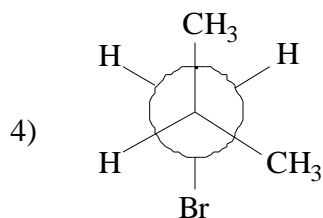
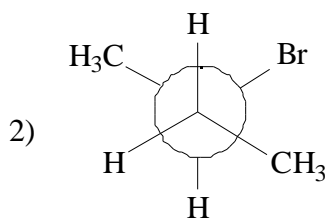
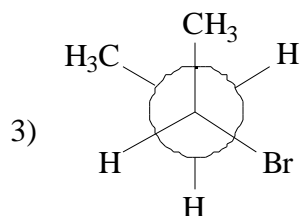
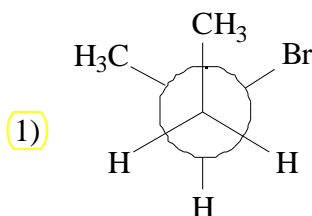
4) *tert*-butyl iodide

5-19 How many isomeric alkenes are possible, including stereoisomers, in the following reaction?

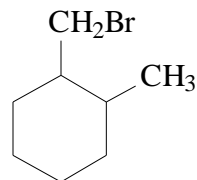
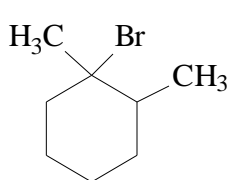
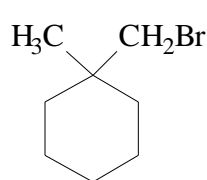


1) one 2) two 3) three 4) four 5) five

5-20 In the dehydrohalogenation of 2-bromobutane, which conformation below leads directly to the formation of *cis*-2-butene?

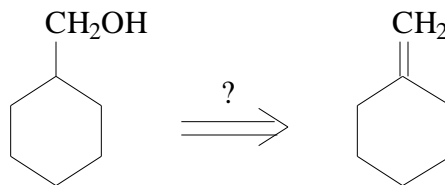


5-21 Which of the following cannot undergo an E2 reaction?



1) A 2) B 3) C 4) none (all can undergo an E2 reaction)

5-22 Which of the following would you predict to be the best method for doing the following conversion with the highest yield?



- 1) H_2SO_4 , heat
- 2) $\text{NaOCH}_2\text{CH}_3$
- 3) (1) PBr_3 (2) $\text{NaOCH}_2\text{CH}_3$
- 4) (1) PBr_3 (2) $\text{KOC}(\text{CH}_3)_3$

This is covered better in Chapter 8.

5-23 When a strong base is used in the elimination reaction of an alkyl halide the mechanism, in general, is:

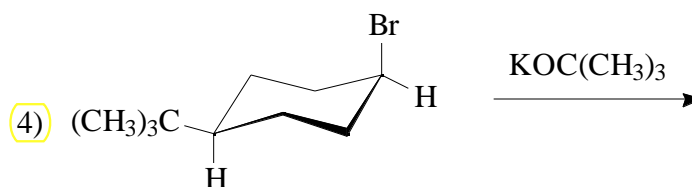
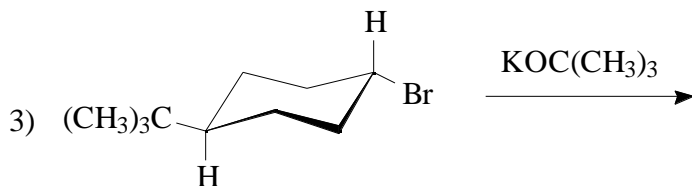
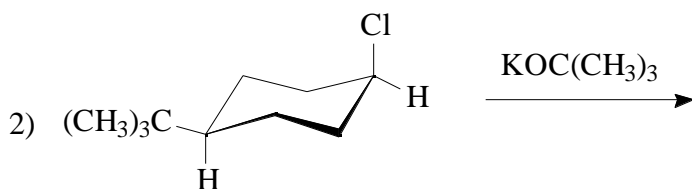
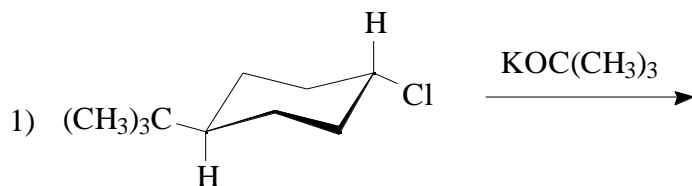
- 1) E1
- 2) E2
- 3) E1 for tertiary halides, E2 for primary and secondary halides
- 4) E2 for tertiary halides, E1 for primary and secondary halides

Again, Chapter 8.

5-24 Which of the following sets of conditions most favors the E1 mechanism?

- 1) When the alkyl halide is tertiary and the base is a weak base.
- 2) When the alkyl halide is tertiary and the base is a strong base.
- 3) When the alkyl halide is primary or secondary and the base is a weak base.
- 4) When the alkyl halide is primary or secondary and the base is a strong base.

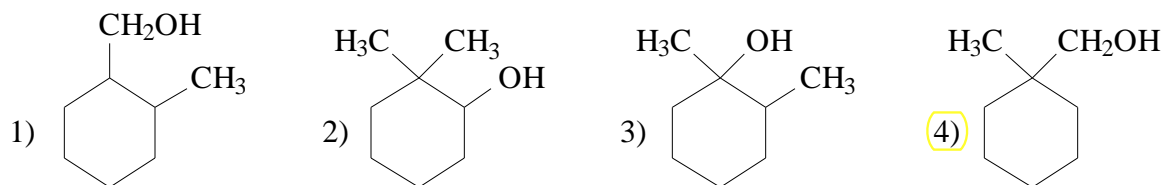
5-25 Which of the following would have the fastest rate of reaction to form 4-tert-butylcyclohexene?



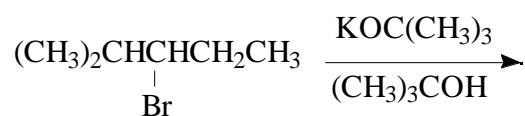
5-26 What is the first step in the mechanism of the dehydration reaction of a tertiary alcohol with sulfuric acid to form an alkene?

- 1) The loss of OH^- to form a carbocation.
- 2) The protonation of the hydroxyl group.
- 3) The loss of the proton from the hydroxyl group to give an alkoxide ion.
- 4) The removal of a β -hydrogen from the alcohol.

5-27 Which of the following does not give 1,2-dimethylcyclohexene as one of the acid-catalyzed dehydration products?

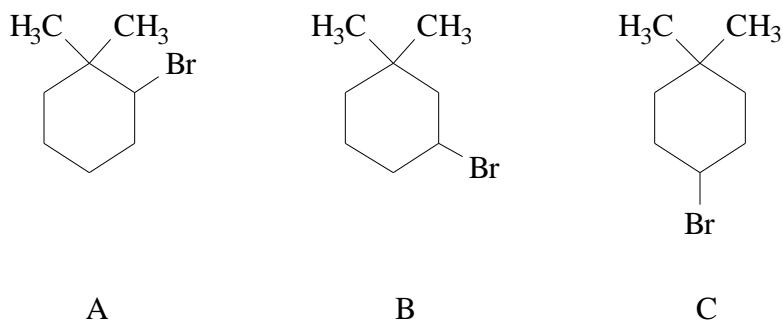


5-28 Including E/Z isomers, how many E2 products are possible in the following reaction?



- 1) one 2) two 3) three 4) four 5) five

5-29 Which of the following compounds gives a single E2 product on reaction with sodium ethoxide, $\text{NaOCH}_2\text{CH}_3$?

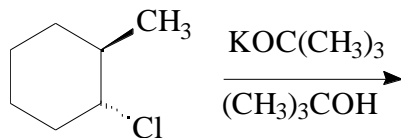


- 1) A and B 2) A and C 3) B and C 4) A, B, and C

5-30 Which of the following will give 2-methyl-1-butene as the only alkene product on treatment with $\text{KOC(CH}_3\text{)}_3$ in dimethyl sulfoxide?

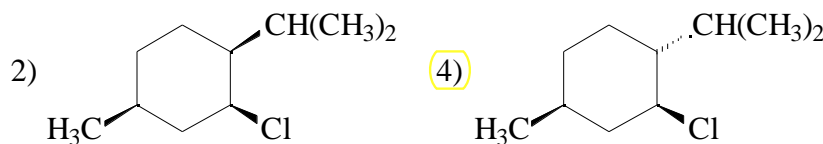
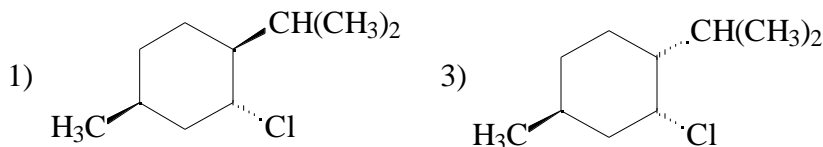
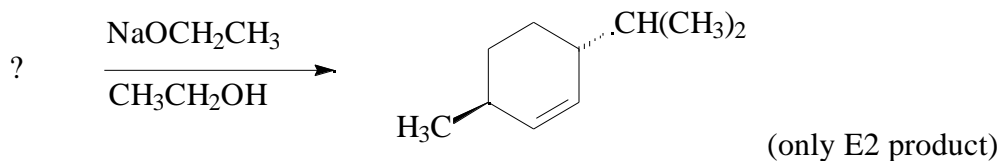
- 1) 2-methylbutane
- 2) 2-methyl-1-butanol
- 3) 2-bromo-2-methylbutane
- 4) 1-bromo-2-methylbutane

5-31 If the following E2 reaction proceeds through an anti-periplanar transition state, what product or products are expected?



- 1) only 3-methylcyclohexene
- 2) only 1-methylcyclohexene
- 3) the major product is 3-methylcyclohexene and the minor product is 1-methylcyclohexene
- 4) the major product is 1-methylcyclohexene and the minor product is 3-methylcyclohexene

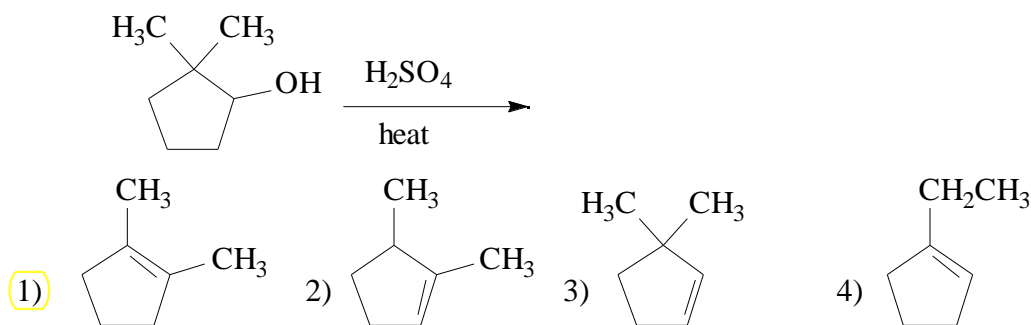
5-32 Which of the following stereoisomers gives the exclusive E2 product shown.



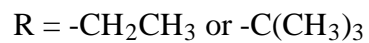
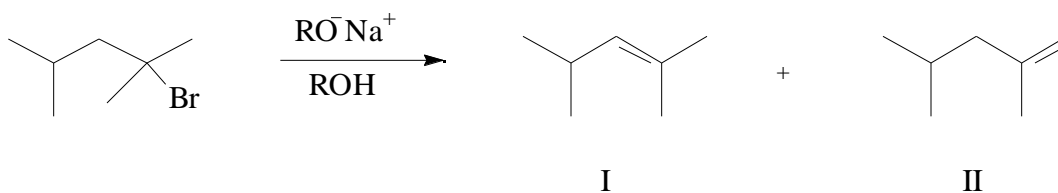
5-33 Zaitsev's rule can be used to predict the major product for which of the following reactions?

- 1) 2-methylpentane + Br₂ (with light)
- 2) 2-bromo-2-methylpentane + NaOCH₂CH₃ (in ethanol)
- 3) 2-methyl-2-pentanol + PBr₃
- 4) 2-methyl-2-pentanol + HCl

5-34 The acid-catalyzed dehydration of the alcohol shown below gives a major product which results from a carbocation rearrangement. Identify this major product.



5-35 Consider the following reaction.



Which statement(s) below is(are) correct?

(A) I is the major product based on Zaitsev's rule.

B. The II:I ratio is greater when $\text{R} = -\text{CH}_2\text{CH}_3$ than when $\text{R} = -\text{C}(\text{CH}_3)_3$.

(C) The II:I ratio is greater when $\text{R} = -\text{C}(\text{CH}_3)_3$ than when $\text{R} = -\text{CH}_2\text{CH}_3$.

1) A and B (2) A and C 3) only B 4) only C

More of II is formed by the larger base because it cannot easily access the central CH_2 .

Chapter 6: Alkene Addition Reactions

6-1 Which of the following is not a metal catalyst for the hydrogenation of an alkene?

- 1) Pd 2) Pt **3) Na** 4) Ni

6-2 What is(are) the product(s) in the Pd-catalyzed hydrogenation of 1,2-dimethylcyclopentene?

- 1) *trans*-1,2-dimethylcyclopentane
2) *cis*-1,2-dimethylcyclopentane
3) a mixture of *trans* and *cis*-1,2-dimethylcyclopentane
4) 1,1-dimethylcyclopentane

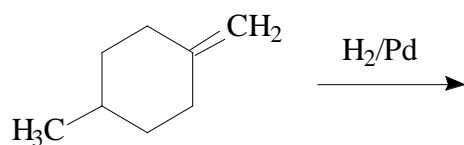
6-3 Which alkene below is thermodynamically the most stable?

- 1) 1-hexene 2) *trans*-3-hexene 3) *cis*-3-hexene **4) 2-methyl-2-pentene**

6-4 The stereochemical pathway for the hydrogenation of an alkene with a metal catalyst, such as platinum, occurs *via*:

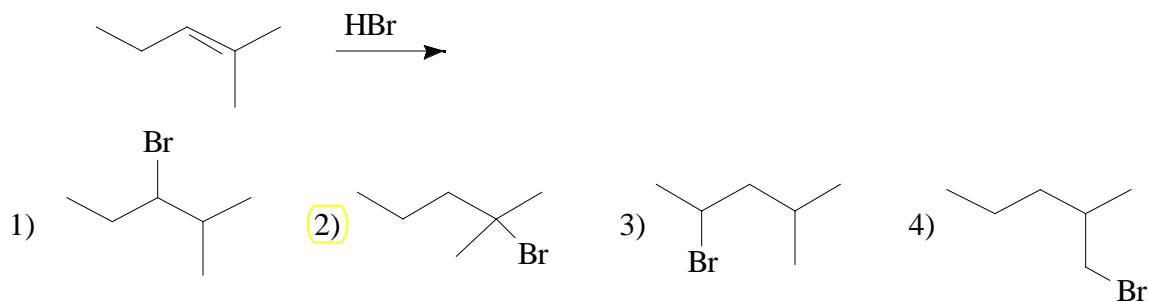
- 1) syn addition** 3) Markovnikov addition
2) anti addition 4) anti-Markovnikov addition

6-5 The product(s) in the following reaction is(are):

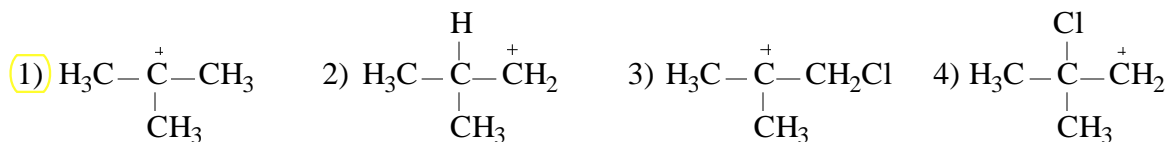
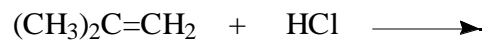


- 1) only *trans*-1-4-dimethylcyclohexane **3) both *trans* and *cis*-1-4-dimethylcyclohexane**
2) only *cis*-1-4-dimethylcyclohexane 4) methylcyclohexane

6-6 What is the major product of the following reaction?



6-7 What is the intermediate in the following reaction?



6-8 Which of the following is not a possible reaction of a carbocation?

- 1) addition of a nucleophile
- 2) rearrangement to a more stable carbocation
- 3) addition of a proton to form an alkane
- 4) loss of a β -hydrogen to form an alkene

6-9 Addition of HCl to 3-methyl-1-pentene gives two products. One of these is 2-chloro-3-methylpentane. What is the other product?

- 1) 1-chloro-3-methylpentane
- 2) 3-chloro-3-methylpentane
- 3) 3-chloro-2-methylpentane
- 4) 2-chloro-2-methylpentane

6-10 Predict which of the following alkenes reacts the fastest with HCl?

- 1) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}=\text{CH}_2$
- 2) *cis* - $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_3$
- 3) *trans* - $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_2\text{CH}_3$
- 4) $(\text{CH}_3)_2\text{C}=\text{CHCH}_2\text{CH}_3$

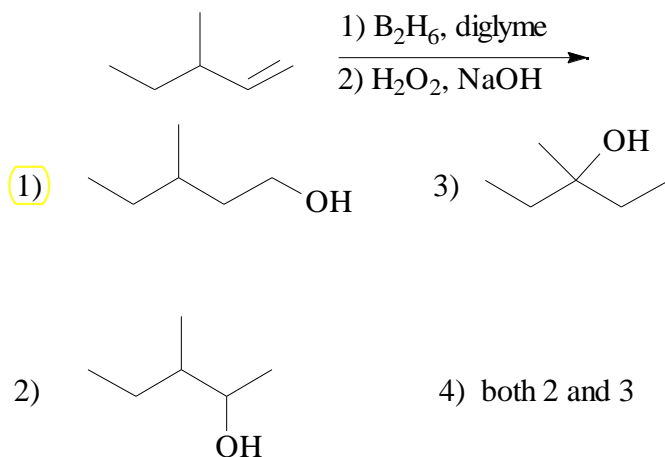
6-11 Which species below is the intermediate in the free radical addition of HBr to 1-butene?

- 1) $\text{H}_3\text{C}-\text{CH}_2-\overset{\bullet}{\text{C}}\text{H}-\text{CH}_3$
- 2) $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\overset{\bullet}{\text{C}}\text{H}_2$
- 3) $\text{H}_3\text{C}-\text{CH}_2-\overset{\bullet}{\text{C}}\text{H}-\text{CH}_2\text{Br}$
- 4) $\text{H}_3\text{C}-\text{CH}_2-\underset{\text{Br}}{\underset{|}{\text{C}}}\text{H}-\overset{\bullet}{\text{C}}\text{H}_2$

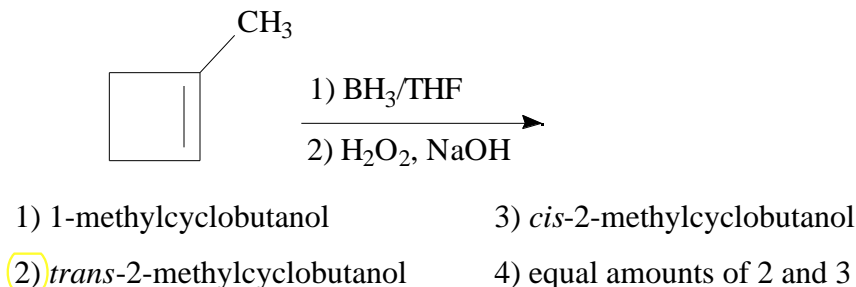
6-12 Which reagent(s) below would work best in converting 2-methyl-2-hexene to 2-methyl-3-hexanol?

- 1) (1) H_2SO_4 (2) H_2O
- 2) 50% $\text{H}_2\text{SO}_4/\text{H}_2\text{O}$
- 3) (1) BH_3/THF (2) $\text{H}_2\text{O}_2, \text{NaOH}$
- 4) $\text{Br}_2/\text{H}_2\text{O}$

6-13 What is(are) the major product(s) of the following reaction?



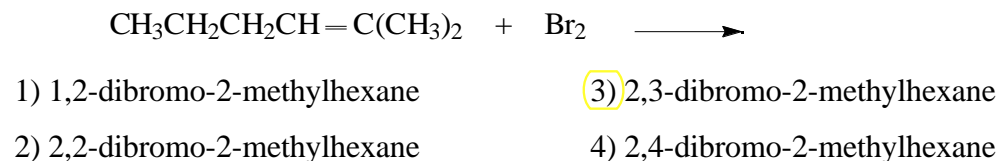
6-14 What is(are) the product(s) of the following hydroboration-oxidation reaction?



6-15 The hydroboration-oxidation reaction can be characterized as the _____ to an alkene.

- 1) anti-Markovnikov syn addition of water
 2) anti-Markovnikov anti addition of water
 3) Markovnikov syn addition of water
 4) Markovnikov anti addition of water

6-16 What is the major product of the following reaction?

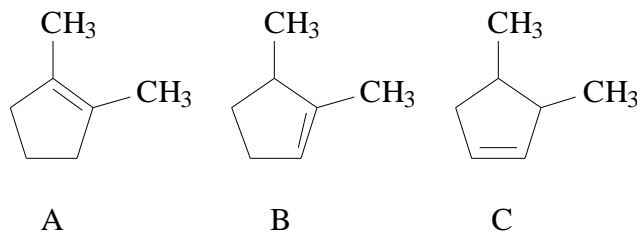


6-17 Which of the following alkenes gives 1-bromo-2-methyl-2-pentanol upon reaction with $\text{Br}_2/\text{H}_2\text{O}$?

- 1) $\text{CH}_3\text{CH}=\text{CHCH}(\text{CH}_3)_2$ 3) $\text{CH}_3\text{CH}_2\text{CH}=\text{C}(\text{CH}_3)_2$
 2) $\text{CH}_3\text{CH}_2\underset{\text{CH}_3}{\text{CH}}\text{CH}=\text{CH}_2$ 4) $\text{CH}_3\text{CH}_2\text{CH}_2\underset{\text{CH}_3}{\text{C}}=\text{CH}_2$

HOBr

6-18 Rank the following in order of decreasing reactivity with bromine, Br_2 .



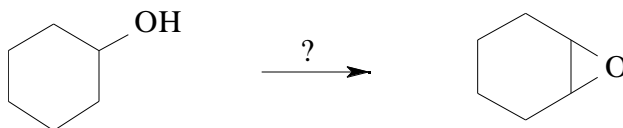
Attack on the bromonium ion is hindered by the methyl groups.

- 1) A>B>C 2) B>C>A 3) C>A>B **4) C>B>A**

6-19 Which of the following is least likely to react with an alkene?

- 1) H_3O^+ 2) BrCl 3) $\text{CH}_3\dot{\text{C}}\text{H}_2$ (ethyl radical) **4) $\text{NaOCH}_2\text{CH}_3$**

6-20 Which of the following series of reactions would convert cyclohexanol to 1,2-epoxycyclohexane?

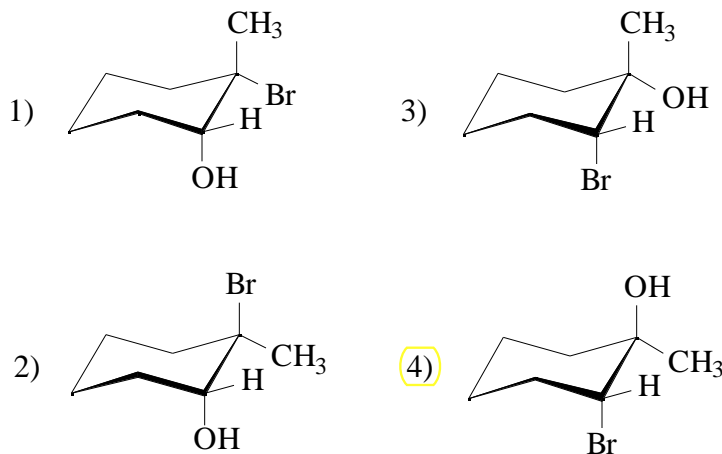


- 1) (1) $\text{NaOCH}_2\text{CH}_3$ (2) $\text{Br}_2, \text{H}_2\text{O}$
 2) (1) $\text{Br}_2, \text{light}$ (2) $\text{NaOCH}_2\text{CH}_3$
3) (1) $\text{H}_2\text{SO}_4, \text{heat}$ (2) $\text{CH}_3\text{C}(=\text{O})\text{OH}, \text{CH}_3\text{CO}_2\text{H}$
 4) (1) $\text{H}_2\text{SO}_4, \text{heat}$ (2) O_3 (3) $\text{Zn}, \text{H}_2\text{O}$

6-21 Which species below acts as the nucleophile in the acid-catalyzed addition of water to an alkene?

- 1) H_3O^+ 2) the carbocation 3) OH^- **4) H_2O**

6-22 Addition of hypobromous acid, HOBr , to 1-methylcyclohexene gives:



Draw as diequatorial isomer.

6-23 A compound, $\text{C}_{15}\text{H}_{24}$, is reacted with excess hydrogen using a metal catalyst. One equivalent of the compound consumed three equivalents of hydrogen. How many rings did the original compound have?

4 DU, 3 C=C
and one ring

- 1) 1 only 2) 2 only 3) 3 only 4) none

6-24 A compound, $C_{20}H_{30}$, can be hydrogenated with platinum metal and hydrogen to give a compound $C_{20}H_{38}$. How many double bonds (DB) and rings (R) does the original compound have? (The original compound has no triple bonds.)

- 1) 4 DB, 2 R 2) 4 DB, 1 R 3) 3 DB, 3 R 4) 2 DB, 4 R

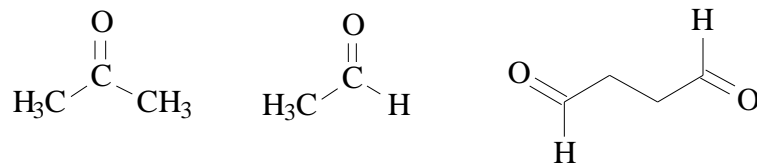
6-25 Determine the degrees of unsaturation (sum of double bonds and rings) for a compound with the formula of C_6H_9BrO .

- 1) 1 only 2) 2 only 3) 3 only 4) four only 5) 0

6-26 The reaction of 1-butene with bromine, Br_2 , in aqueous solution gives primarily 1-bromo-2-butanol. Identify the nucleophilic species in the reaction.

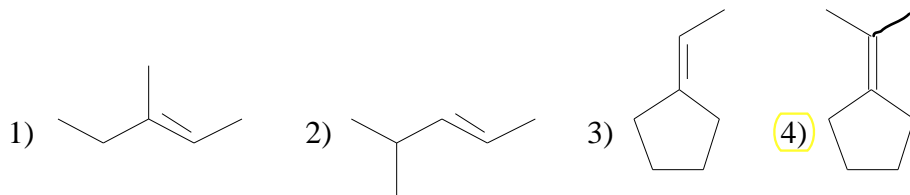
- 1) Br_2 2) Br^- 3) H_2O 4) $HOBr$

6-27 A compound is treated with ozone followed by zinc in water to give the following three products. Which structure below best fits the data?

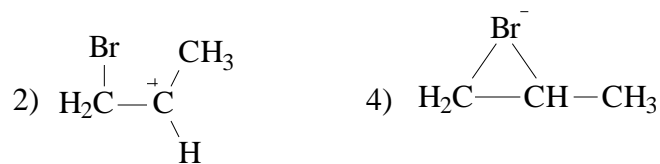
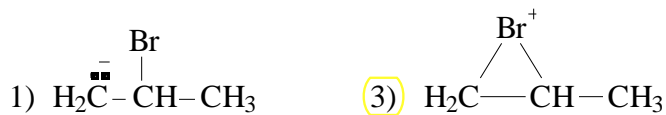


- 1) $CH_3CH=CH(CH_2)_3CH=C(CH_3)_2$ 3) $H_2C=C(CH_3)CH_2CH_2C(CH_3)=CHCH_3$
- 2) $(CH_3)_2C=CHCH_2CH_2CH=CHCH_3$ 4) $H_2C=CHCH_2CH_2C(CH_3)=C(CH_3)_2$

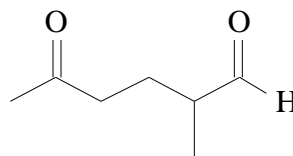
6-28 Which of the following gives acetone, $(CH_3)_2C=O$, as one of the products of its ozonolysis?



6-29 Which of the following species is the intermediate in the bromination of propene?

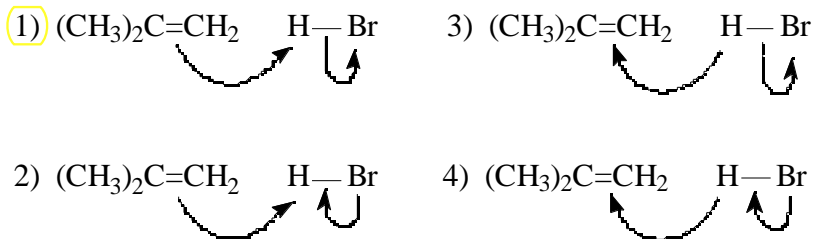


6-30 A compound, $\text{C}_7\text{H}_{13}\text{Cl}$, is reacted with sodium ethoxide and gives a single elimination product, C_7H_{12} . Treatment with ozone followed by zinc and water gives the compound below. Identify the original compound.

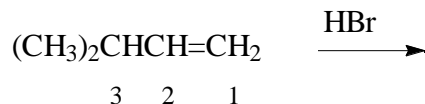


- 1) 2-chloro-1,1-dimethylcyclopentane
- 2) 1-chloro-1,2-dimethylcyclopentane
- 3) 4-chloro-1,2-dimethylcyclopentane
- ④) 2-chloro-1,3-dimethylcyclopentane

6-31 Which of the following correctly depicts the mechanistic first step in the addition of HBr to 2-methylpropene

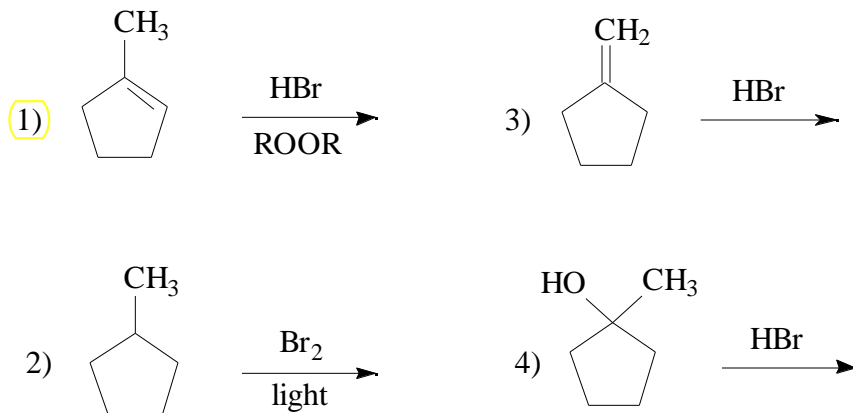


6-32 The rearrangement which occurs in the following reaction can be described as a:

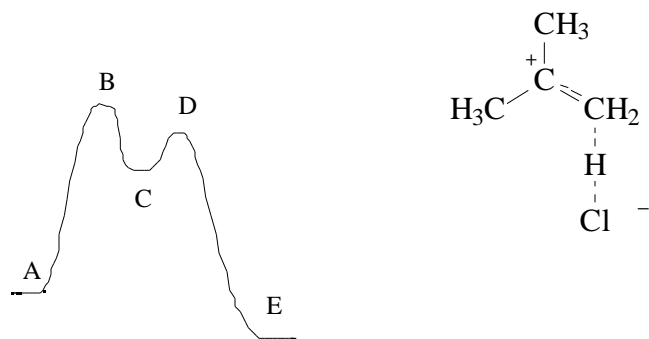


- 1) hydride shift from C-2 to C-1
- ②) hydride shift from C-3 to C-2
- 3) proton shift from C-2 to C-1
- 4) proton shift from C-3 to C-2

6-33 Which of the following does not give 1-bromo-1-methylcyclopentane as the major product?

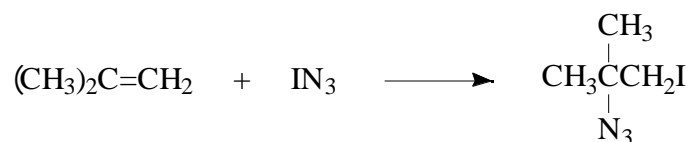


6-34 Which point on the potential energy diagram corresponds to the species below for the reaction of 2-methylpropene with hydrogen chloride?



- 1) A 2) B 3) C 4) D 5) E

6-35 Identify the nucleophile in the following electrophilic addition reaction.



- 1) N_3^- 2) N_3^+ 3) I^+ 4) I^-

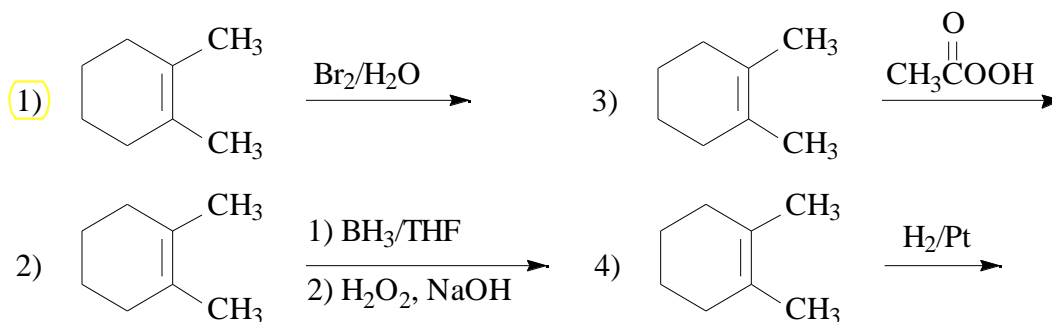
6-36 Which of the following is the rate-determining step in the acid-catalyzed addition of water to 2-methylpropene?

- 1) $(\text{CH}_3)_2\text{C}=\text{CH}_2 + \text{H}_3\text{O}^+ \longrightarrow (\text{CH}_3)_3\text{C}^+ + \text{H}_2\text{O}$
- 2) $(\text{CH}_3)_3\text{C}^+ + \text{H}_2\text{O} \longrightarrow (\text{CH}_3)_3\text{C}-\text{OH}_2^+$
- 3) $(\text{CH}_3)_3\text{C}-\text{OH}_2^+ + \text{H}_2\text{O} \longrightarrow (\text{CH}_3)_3\text{C}-\text{OH} + \text{H}_3\text{O}^+$
- 4) $(\text{CH}_3)_3\text{C}^+ + \text{H}_2\text{O} \longrightarrow (\text{CH}_3)_2\text{C}=\text{CH}_2 + \text{H}_3\text{O}^+$

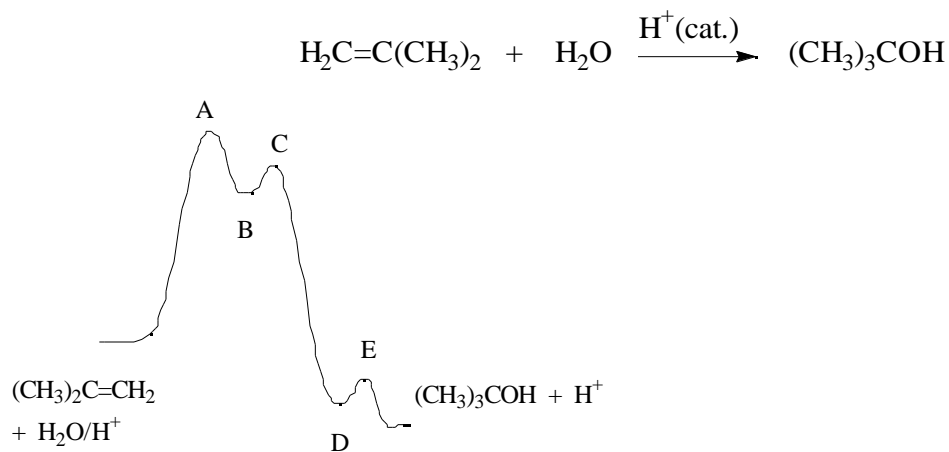
6-37 Which reaction sequence below would work best in converting 3-pentanol into 2,3-dibromopentane?

- 1) (1) H_2SO_4 , heat (2) HBr (3) Br_2 , light
 2) (1) H_2SO_4 , heat (2) H_2/Pt (3) 2Br_2 , light
 3) (1) Br_2 , light (2) H_2SO_4 , heat (3) H_2/Pt
 4) (1) H_2SO_4 , heat (2) Br_2

6-38 Which reaction proceeds by anti addition?

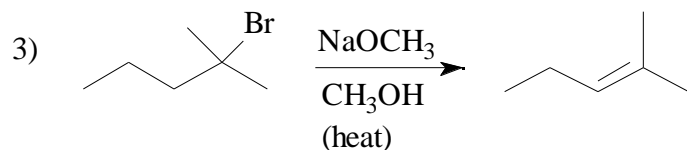
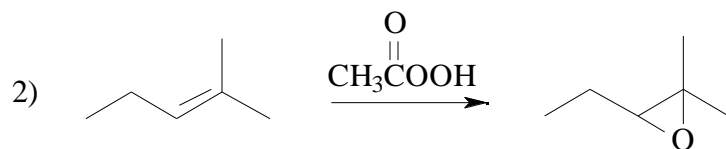


6-39 Which point on the potential energy diagram corresponds to the carbocation intermediate, $(\text{CH}_3)_3\text{C}^+$, for the reaction shown below?



- 1) A 2) B 3) C 4) D 5) E

6-40 Which of the following reactions occurs by a two-step mechanism as opposed to a one-step mechanism?



#3 could also proceed by an E1 mechanism.



6-41 What is the product in the following reaction?

