



# ORGANIC CHEMISTRY

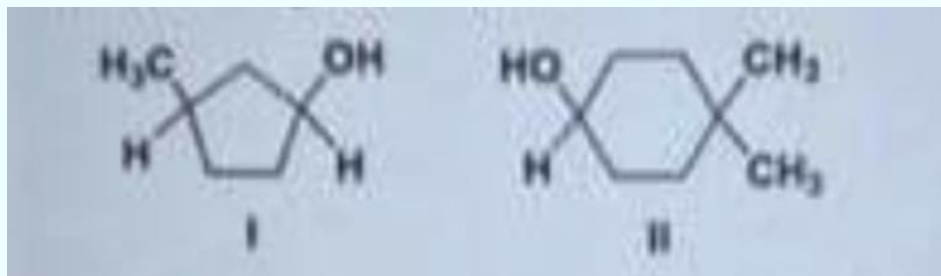
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*Made by: Rahaf Jurab*

*& Lara Fryjat*

## Final 020

**Q1:** What is the number of configurational stereoisomers is possible for each of the following molecules:



- a. I has 2 stereoisomers; II has 0
- b. I has 4 stereoisomers; II has 0
- c. I has 2 stereoisomers; II has 2
- d. I has 3 stereoisomers; II has 4
- e. I has 4 stereoisomers; II has 2

**Answer:** b

**Q2:** Which carbonyl compound reacts fastest with nucleophiles?

- a. 2,2-dimethylbutanal
- b. Cyclopentanone
- c. 2,4,6-trimethylbenzaldehyde
- d. Acetone
- e. 2,2-dichloropropanal

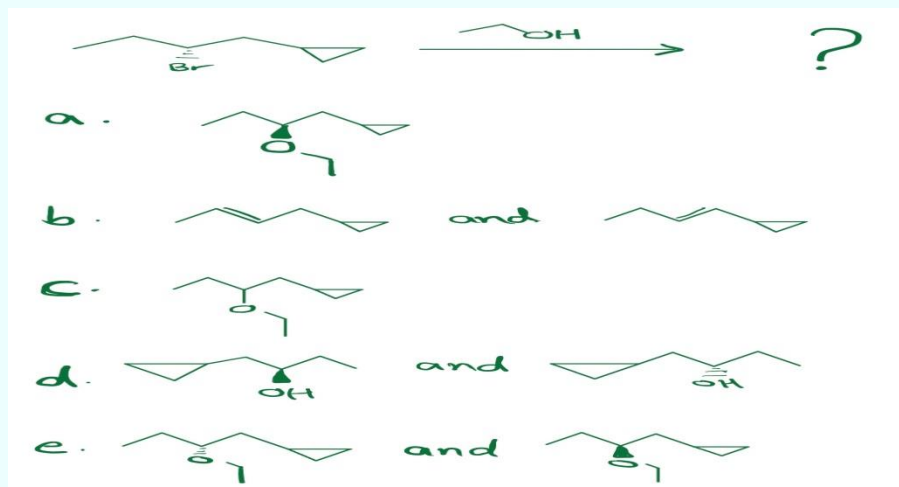
**Answer:** e

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**Q3: what is the major product of the following reaction?**

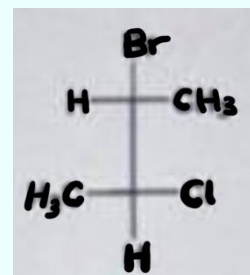
- a. *A*
- b. *B*
- c. *C*
- d. *D*
- e. *F*

**Answer: e**



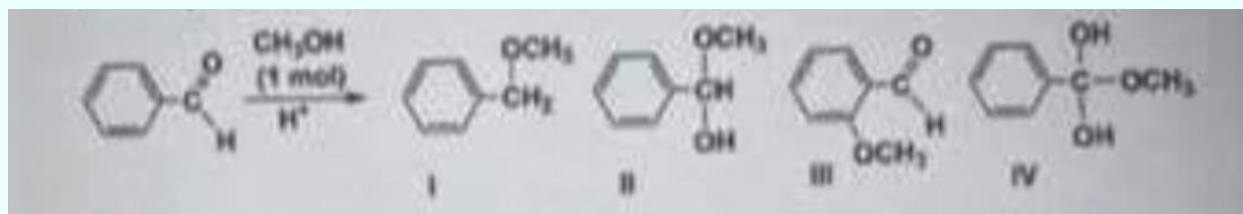
**Q4: what is the correct name of the following molecule?**

- a. (2*R*,3*R*)-2-bromo-3-chlorobutane
- b. (2*S*,3*R*)-2-bromo-3-chlorobutane
- c. (2*S*,3*S*)-2-bromo-3-chlorobutane
- d. racemic-2-bromo-3-chlorobutane
- e. (2*R*,3*S*)-2-bromo-3-chlorobutane



**Answer: e**

**Q5: what major product(s) will be found from this reaction?**

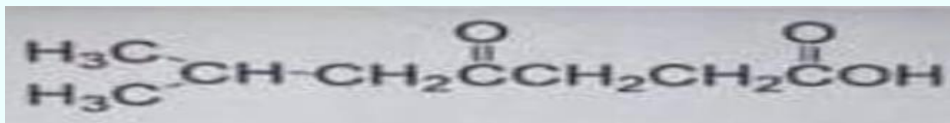


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- a. I
- b. II and IV
- c. III
- d. II
- e. IV

*Answer:d*

Q6:

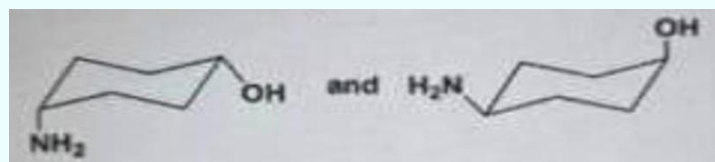


- a. *6-methyl-4-heptanoic acid*
- b. *6-methyl-4-oxoheptanoic acid*
- c. *6-methyl-1-hydroxy-1,4-heptandione*
- d. *5-isopropyl-4-oxopentanoic acid*
- e. *5-methyl-3-oxohexanoic acid*

*Answer:b*

Q7: *what is the relationship between the following pair of molecules?*

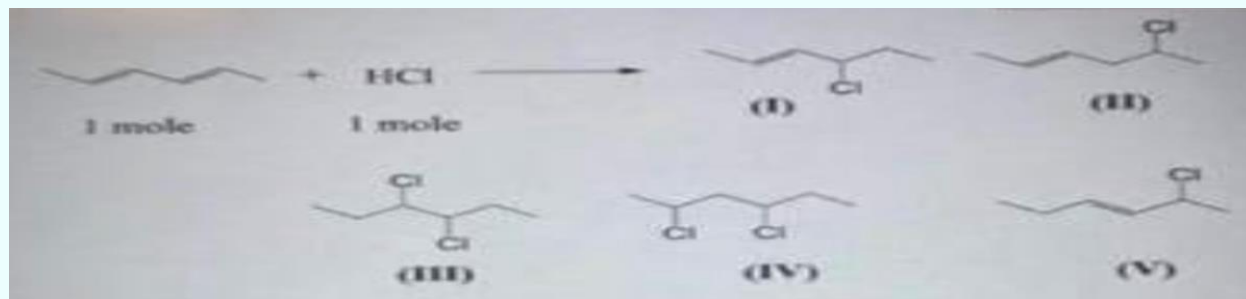
- a. *Identical*
- b. *Constitutional isomers*
- c. *Conformers*
- d. *Enantiomers*
- e. *Cis-trans isomers*



*Answer:c*

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Q8: In the reaction below, the product is?



- a. III and IV
- b. III only
- c. IV only
- d. I and V
- e. II only
- f. I only

Answer: d

Q9: which reaction sequence converts benzene into *m*-chloriodobenzene?

- a. 1)  $\text{Cl}_2/\text{FeCl}_3$ , 2) HCL, then KI
- b. 1)  $\text{KI}/\text{Cu}_2\text{I}_3(0^\circ \text{C})$ , 2)  $\text{Cl}_2/\text{FeCl}_3$
- c. 1)  $\text{Cl}_2/\text{FeCl}_3$ , 2)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 3)  $\text{SnCl}_2/\text{HCL}$ , 4)  $\text{NaNO}_2/\text{H}^+(0^\circ \text{C})$ , then KI
- d. 1)  $\text{Cl}_2/\text{FeBr}_3$ , 2)  $\text{SnCl}_2/\text{HCL}$ , 3)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 4)  $\text{NaNO}_2/\text{HBr}/\text{Cu}_2\text{Br}_2(0^\circ \text{C})$
- e. 1)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 2)  $\text{Cl}_2/\text{FeCl}_3$ , 3)  $\text{SnCl}_2/\text{HCL}$ , 4)  $\text{NaNO}_2/\text{H}^+(0^\circ \text{C})$ , then KI

Answer: e

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Q10: The alcohol which reacts fastest with Lucas's reagent (HCl/ZnCl<sub>2</sub>) is:

- a. Isobutyl alcohol
- b. Isopropyl alcohol
- c. 1-butanol
- d. 2-methyl-2-butanol
- e. Sec-butyl alcohol

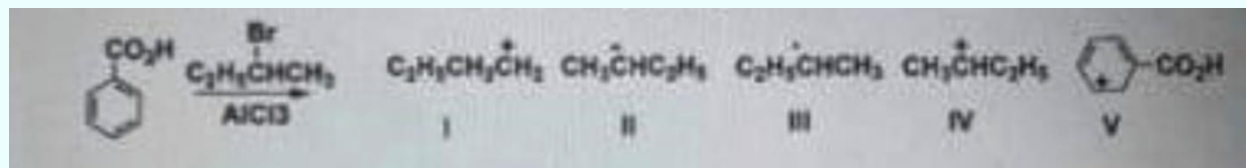
Answer: d

Q11: Which of the following compounds is never chiral?

- a. 1-bromo-2-chlorobutane
- b. 1,2-dichlorobutane
- c. 1,4-dibromobutane
- d. 1,3-dibromobutane
- e. 2,3-dibromobutane

Answer: c

Q12: Which is the electrophilic reagent generated in this reaction?



- a. V
- b. I
- c. II

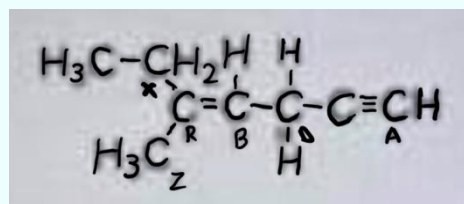
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- d. IV
- e. III

Answer: d

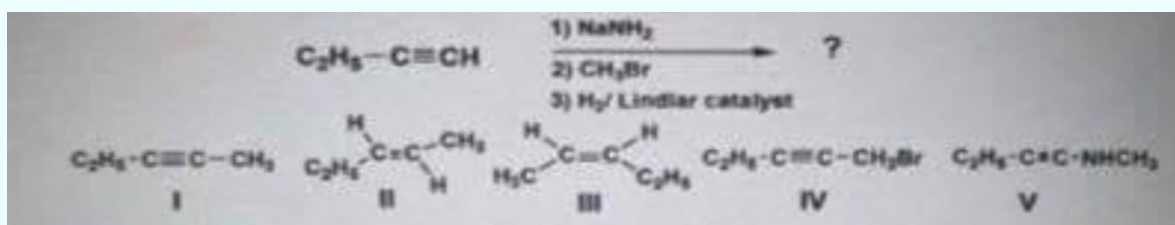
Q13: In the structure below which carbon atom (A, B, D, R, X, and Z) is the most electronegative

- a. D
- b. Z
- c. X
- d. B
- e. R
- f. A



Answer: f

Q14: What is the major product of the following reaction?

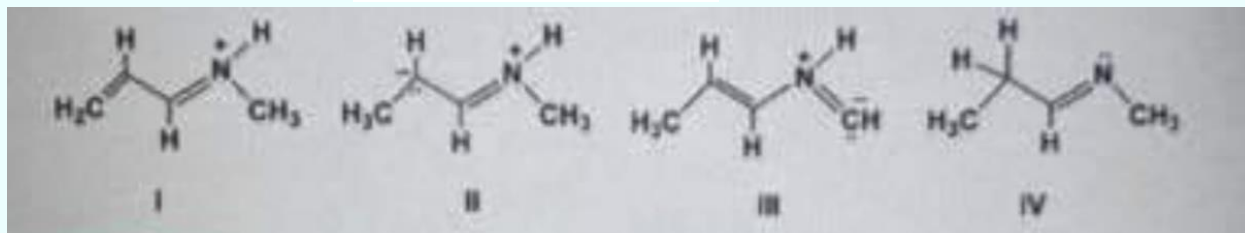
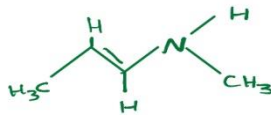


- a. III
- b. II
- c. I
- d. IV
- e. V

Answer: a

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Q15: Which structure is a correct resonance structure of this molecule?



- a. II only
- b. I only
- c. IV only
- d. I and III
- e. III only

Answer: a

Q16: Starting with *p*-bromonitrobenzene what sequence of reactions will produce nitrobenzene?

- a. 1. H<sub>2</sub>O, 2. Mg/ether
- b. 1. Br<sub>2</sub>/AlBr<sub>3</sub>, 2. Mg/ether, 3. D<sub>2</sub>O
- c. 1. Mg/ether, 2. H<sub>2</sub>O
- d. 1. H<sub>2</sub>O, 2. Br<sub>2</sub>/AlBr<sub>3</sub>
- e. 1. H<sub>2</sub>SO<sub>4</sub>, 2. Mg/ether, 3. D<sub>2</sub>O

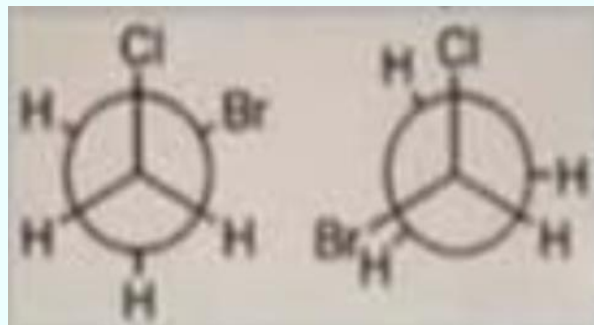
Answer: c



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Q17: What is the relationship between the following pair?

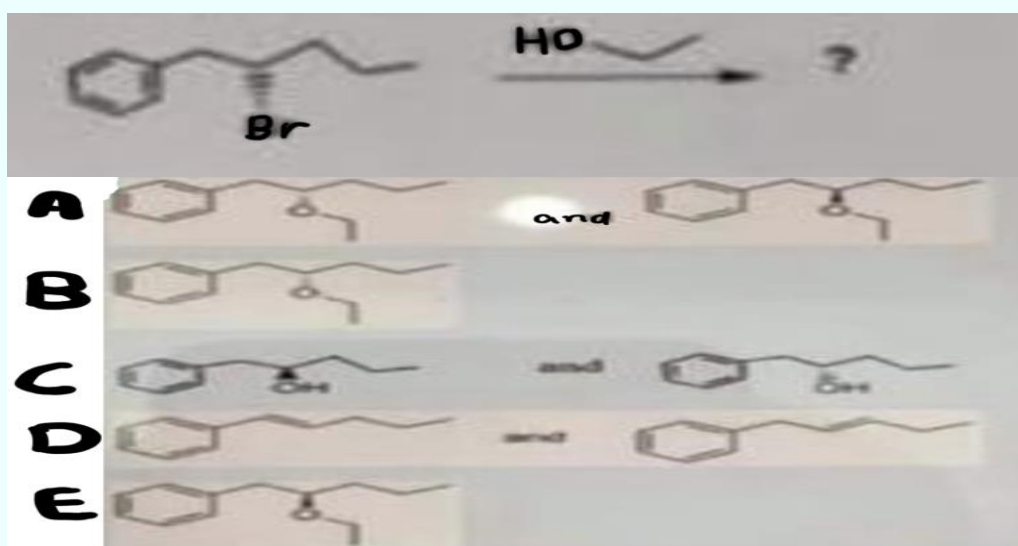
- a. Enantiomers
- b. Conformers
- c. Diastereomers
- d. Identical
- e. Constitutional isomers



Answer: e

Q18: What is the major product of the following reaction?

- a. A
- b. B
- c. C
- d. D
- e. E



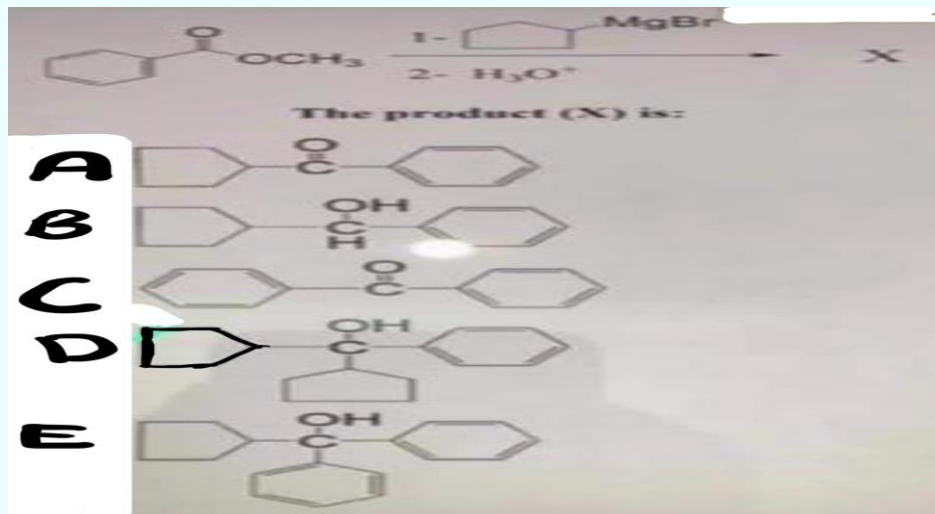
A

Answer: a

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Q19: The product (X) is:

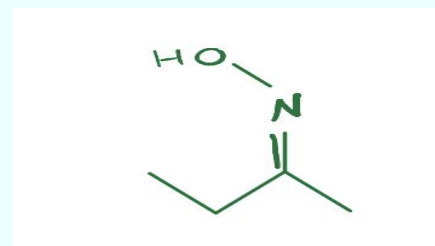
- a. A
- b. B
- c. C
- d. D
- e. F



Answer: d

Q20: What starting material would give this compound as major product?

- a. Butanone +  $\text{NH}_3/\text{H}_2\text{O}$
- b. Ethyl methyl ketone + hydrazine +  $\text{H}_2\text{O}$
- c. 1-butene +  $\text{HBr}$ , then  $\text{NH}_3/\text{H}_2\text{O}$
- d. 2-butene +  $\text{NH}_2\text{OH}$
- e. Butanone + hydroxylamine



Answer: e

Q21: What products will be formed when 2-butene is treated with *m*-chloroperoxybenzoic acid (peroxyacid) followed by methanol/ $\text{H}^+$ ?

- a. 3-chlorobutan-2-ol
- b. 2,3-butanediol
- c. 2-butene oxide

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d. *Butyl methyl ketone*

e. *3-methoxybutan-2-ol*

*Answer: e*

Q22: *Which carbonyl compound reacts fastest with nucleophiles:*

a. *2,2-dichloropropanal*

b. *Cyclopentanone*

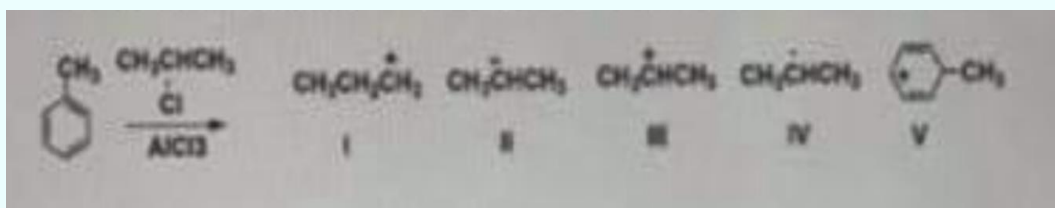
c. *2,4,6-trimethylbenzaldehyde*

d. *2,2-dimethylbutanal*

e. *Acetone*

*Answer: a*

Q23: *Which is the electrophilic reagent generated in this reaction?*



a. III

b. IV

c. V

d. II

e. I

*Answer: a*

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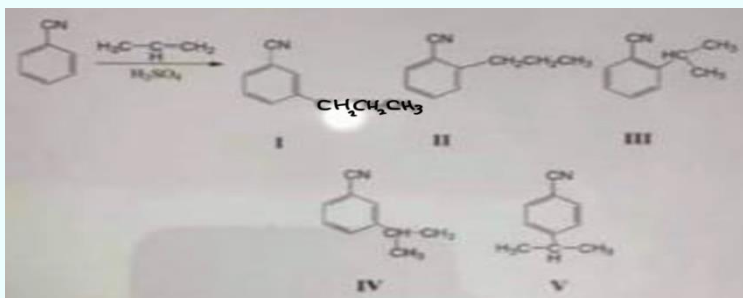
Q24: Which molecular formula corresponds to a cycloalkene?

- a.  $C_{11}H_{16}$
- b.  $C_9H_{12}$
- c.  $C_{10}H_{18}$
- d.  $C_8H_{18}$
- e.  $C_7H_{14}$

Answer: c

Q25: The product(s) in the following reaction is(are):

- a. II only
- b. I and IV
- c. V only
- d. IV only
- e. III and V



Answer: d

Q26: Starting with *p*-bromotoluene what sequence of reactions will produce *p*-deuteriotoluene?

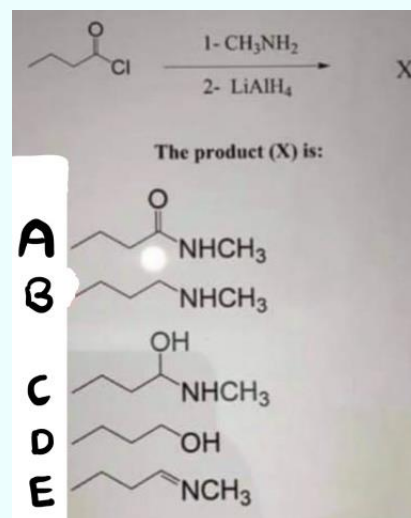
- a. 1.  $D_2O$ , 2.  $Mg/ether$
- b. 1.  $H_2SO_4$ , 2.  $Mg/ether$ , 3.  $D_2O$
- c. 1.  $Br_2/AlBr_3$ , 2.  $Mg/ether$ , 3.  $D_2O$
- d. 1.  $Mg/ether$ , 2.  $D_2O$
- e. 1.  $D_2O$ , 2.  $Br_2/AlBr_3$

Answer: d

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**Q27:** In the following reaction, the product (X) is:

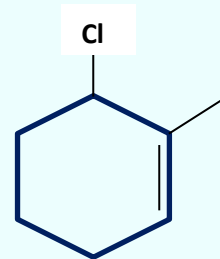
- a. A
- b. B
- c. C
- d. D
- e. E



**Answer: b**

**Q28:** What is the correct IUPAC name of the following compound:

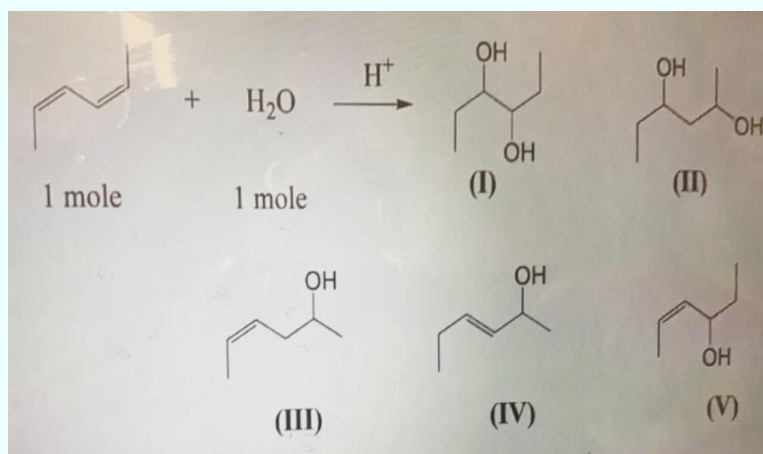
- a. 3-chloro-2-methyl-1-cyclohexene
- b. 1-chloro-2-methylcyclohexene
- c. 2-chloro-1-methylcyclohexene
- d. 3-chloro-2-methylcyclohexene
- e. 6-chloro-1-methylcyclohexene



**Answer: e**

**Q29:** In the reaction below, the product is (are):

- a. IV and V
- b. III and V
- c. I only
- d. V only



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e. I and II

*Answer: b*

**Q30:** *The alcohol which reacts slowest with Lucas's reagents (HCl/ZnCl<sub>2</sub>) is:*

- a. *Tert-butyl alcohol*
- b. *1-pentanol*
- c. *Cyclopentanol*
- d. *Sec-butyl alcohol*
- e. *2-propanol*

*Answer: b*

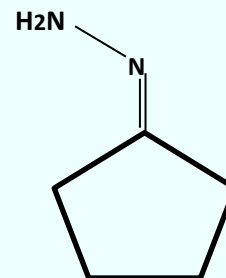
**Q31:** *Which of the following water-insoluble compounds becomes soluble upon addition of NaOH?*

- a. *Cycloheptene*
- b. *Acetophenone*
- c. *2-octanol*
- d. *m-ethylphenol*
- e. *m-bromoaniline*

*Answer: a*

**Q32:** *What starting materials would give this compound as major product?*

- a. *Cyclopentene + NH<sub>3</sub>/NaOH*
- b. *Cyclopentanone + NH<sub>3</sub> (excess)*



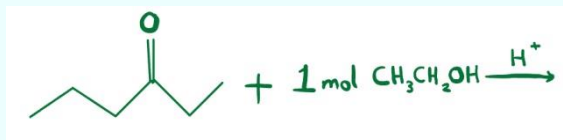
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- c. *Cyclopentanone + hydroxylamine*
- d. *Cyclopentene + HBr, then NH<sub>3</sub>/OH-*
- e. *Cyclopentanone + hydrazine*

*Answer:e*

*Q33: The product of the following reaction is*

- a. *A*
- b. *B*
- c. *C*
- d. *D*
- e. *F*



**A**  
**B**  
**C**  
**D**  
**E**

*Answer:d*

*Q34: Which of the following phenols is the most acidic?*

- a. *2,4,6-trimethylphenol*
- b. *2,4-dimethylphenol*
- c. *p-tert-butylphenol*
- d. *2,4-dichlorophenol*
- e. *3-chlorophenol*

*Answer:d*

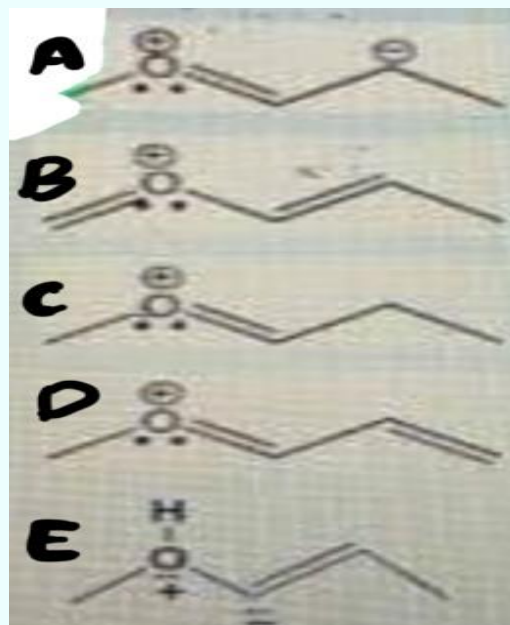
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Q35: Which structure represents a correct resonance structure for the following molecule:



- a. *A*
- b. *B*
- c. *C*
- d. *D*
- e. *F*

Answer: a



Q36: Which of the following compounds is never chiral?

- a. 1-cyclopropyl-2-fluoro-butane
- b. 2,3-dicyclopropylbutane
- c. Butane-1,2-diol
- d. 1,4-diiodobutane
- e. 1,3-difluorobutane

Answer: d

Q37: The product(s) in the following reaction is(are):

- a. II and III
- b. V only

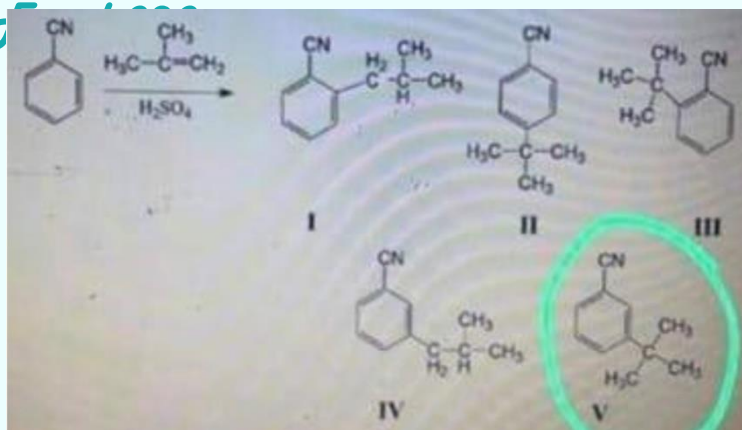


c. III and IV

d. III only

e. IV only

**Answer: b**



**Q38: The best Williamson synthesis of sec-butyl methyl ether involves the following reaction:**

a. 2-bromobutane + bromomethane in basic media

b. Sodium sec-butoxide + methyl bromide

c. 2-butanol + methanol in acidic media

d. 1-butene + methanol in acidic media

e. 2-bromobutane + sodium methoxide

**answer: b**

**Q39: In the structure below which carbon atom (A, B, D, R, X and Z) is the most electronegative**

a. D

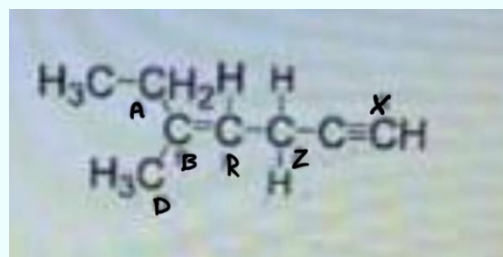
b. B

c. Z

d. A

e. R

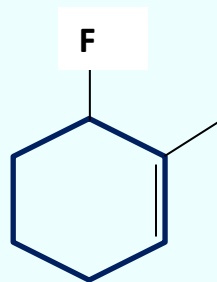
f. X



**Answer: f**

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Q40: What is the correct IUPAC name of the following compound:



- a. 1-fluoro-2-methylcyclohexene
- b. 6-fluoro-1-methylcyclohexene

Answer: b

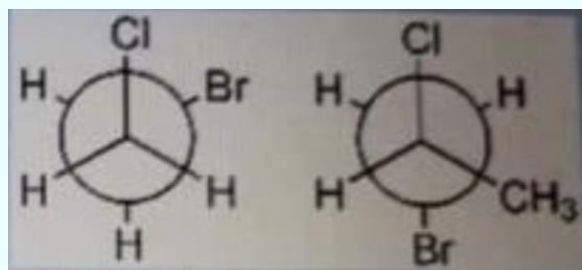
Q41: Which carbonyl compound reacts slowest with nucleophiles?

- a. Acetaldehyde
- b. Cyclohexanone
- c. Diethyl ketone
- d. Formaldehyde
- e. Diisopropyl ketone

Answer: e

Q42: What is the relationship between the following pair?

- a. Identical
- b. Enantiomers
- c. Conformers
- d. Not isomers
- e. Diastereomers



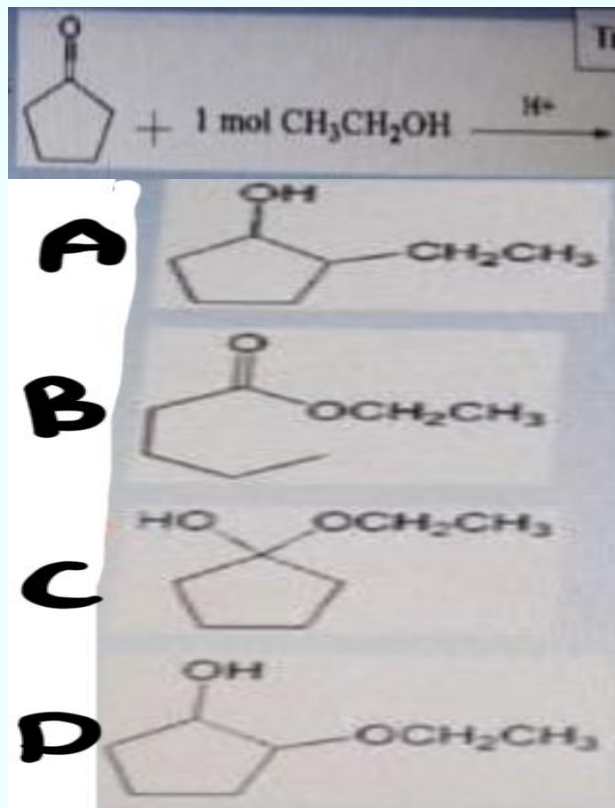
Answer: d

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Q43: The product of the following reaction is

- a. A
- b. B
- c. C
- d. D

Answer: c



Q44: The best Williamson synthesis of isopropyl methyl ether involves the following reaction:

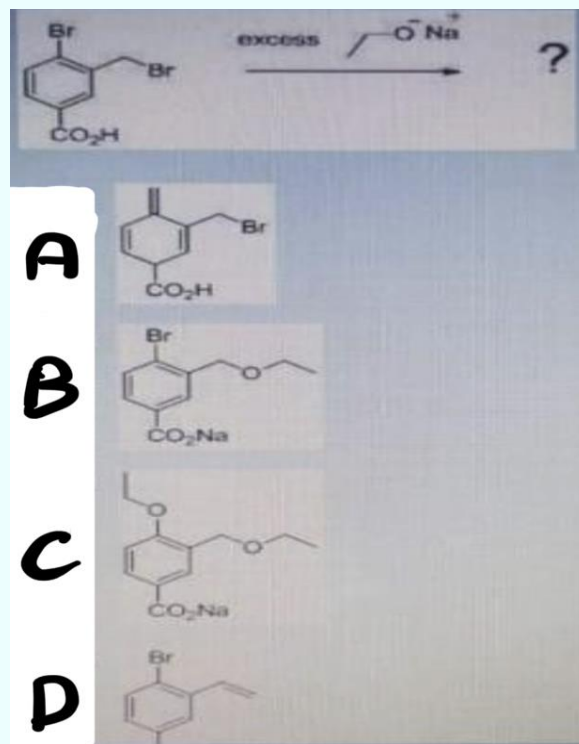
- a. 2-bromopropene + bromomethane in basic media
- b. Propene + methanol in acidic media
- c. Isopropyl bromide + sodium methoxide
- d. Sodium isopropoxide + methyl bromide
- e. 2-propanol + methanol in acidic media

Answer: d

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Q45: What is the major product of the following reaction?

- a. *A*
- b. *B*
- c. *C*
- d. *D*



Answer: b

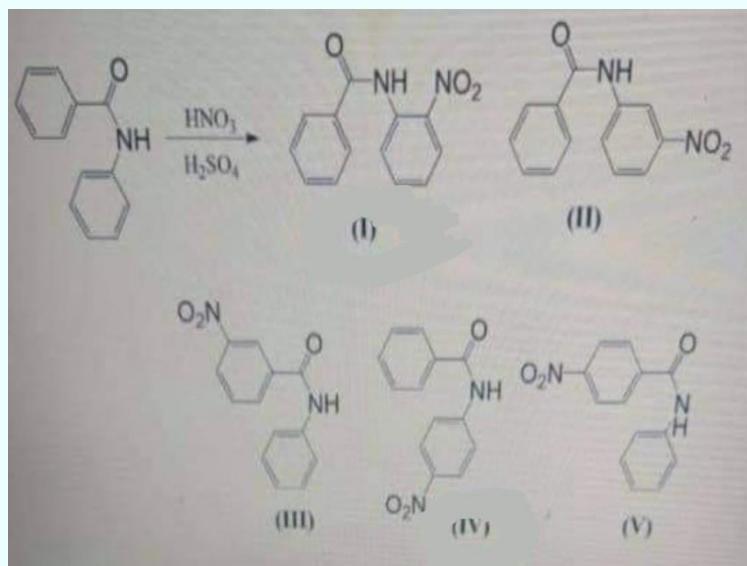
Q46: Which reaction sequence converts benzene into *m*-bromochlorobenzene?

- a. 1)  $\text{HBr}/\text{Cu}_2\text{Br}_2$ , 2)  $\text{HCl}/\text{Cu}_2\text{Cl}_2(0^\circ\text{C})$
- b. 1)  $\text{Br}_2/\text{FeBr}_3$ , 2)  $\text{HCl}/\text{Cu}_2\text{Cl}_2(0^\circ\text{C})$
- c. 1)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 2)  $\text{Br}_2/\text{FeBr}_3$ , 3)  $\text{SnCl}_2/\text{HCl}$ , 4)  $\text{NaNO}_2/\text{HCl}/\text{Cu}_2\text{Cl}_2(0^\circ\text{C})$
- d. 1)  $\text{Cl}_2/\text{FeCl}_3$ , 2)  $\text{SnBr}_2/\text{HBr}$ , 3)  $\text{NaNO}_2/\text{HCl}/\text{Cu}_2\text{Br}_2(0^\circ\text{C})$
- e. 1)  $\text{Br}_2/\text{FeBr}_3$ , 2)  $\text{HNO}_3/\text{H}_2\text{SO}_4$ , 3)  $\text{SnCl}_2/\text{HCl}$ , 4)  $\text{NaNO}_2/\text{HCl}/\text{Cu}_2\text{Cl}_2(0^\circ\text{C})$

Answer: c

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Q47: The product(s) in the following reaction is (are)

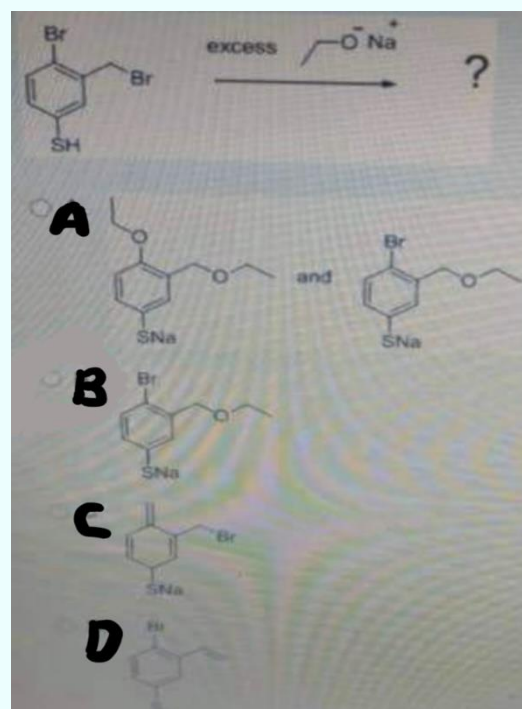


Answer: I and IV

Q48: What is the major product of the following reaction?

- a. A
- b. B
- c. C
- d. D

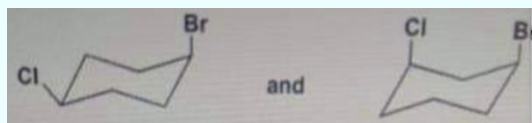
Answer: b



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Q49: What is the relationship between the following pair of molecules?

- Cis-trans isomers
- Enantiomers
- Constitutional isomers
- Conformers
- Identical



Answer:c

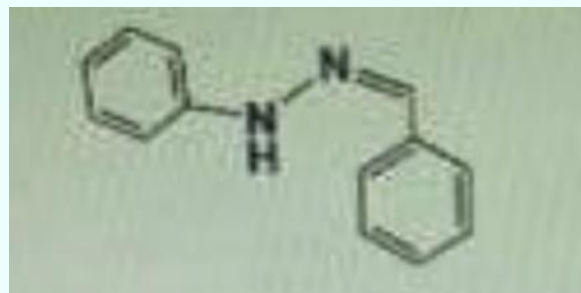
Q50: Which combination of reactants form a cyanohydrin?

- Benzaldehyde + HCN/NaOH
- Benzyl alcohol + HCN/NaOH
- Bromobenzene + NaCN
- Phenol + NaCN
- Benzoic acid + HCN/NaOH

Answer:a

Q51: What starting materials would give this compound as major product?

- Benzaldehyde + aniline
- Acetophenone + aniline
- Benzaldehyde + phenylhydrazine
- Benzaldehyde + hydroxylamine
- Acetophenone + aniline



Answer:c

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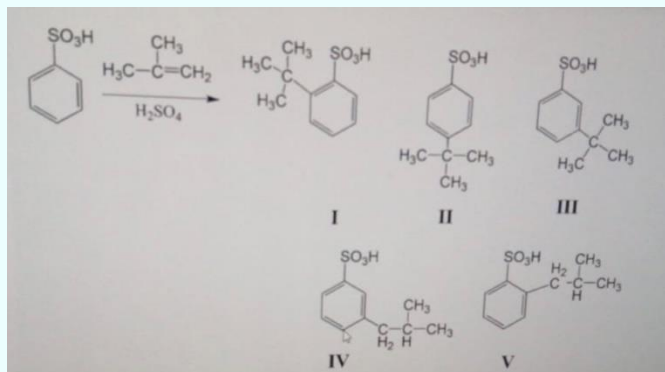
**Q52:** Which of the following is least reactive toward nucleophilic acyl substitution?

- a.  $\text{CH}_3\text{COCl}$
- b.  $\text{CH}_3\text{CO}_2\text{CH}_3$
- c.  $\text{CH}_3\text{CONH}_2$
- d.  $\text{C}_6\text{H}_5\text{CO}_2\text{CH}_3$
- e.  $\text{CH}_3\text{COOCOCH}_3$

**Answer:** c

**Q53:** The product(s) in the following reaction is (are)

- a. I and II
- b. V only
- c. III and IV
- d. III only
- e. IV only

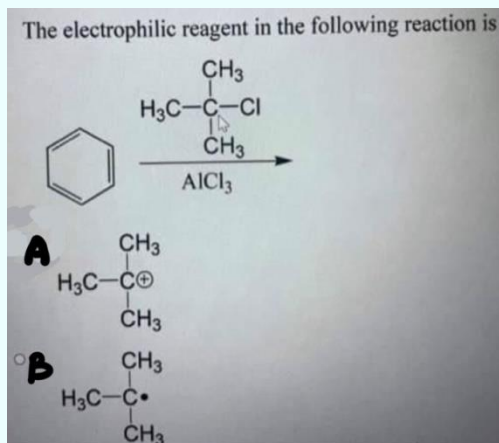


**Answer:** d

**Q54:** The electrophilic reagent in the following reaction is:

- a. **A**
- b. **B**

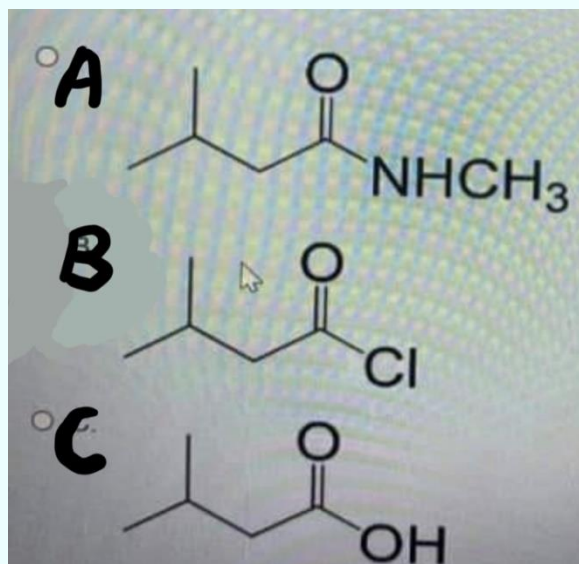
**Answer:** a



Final 020

Q55: Which of the following is most reactive toward substitution within KCN?

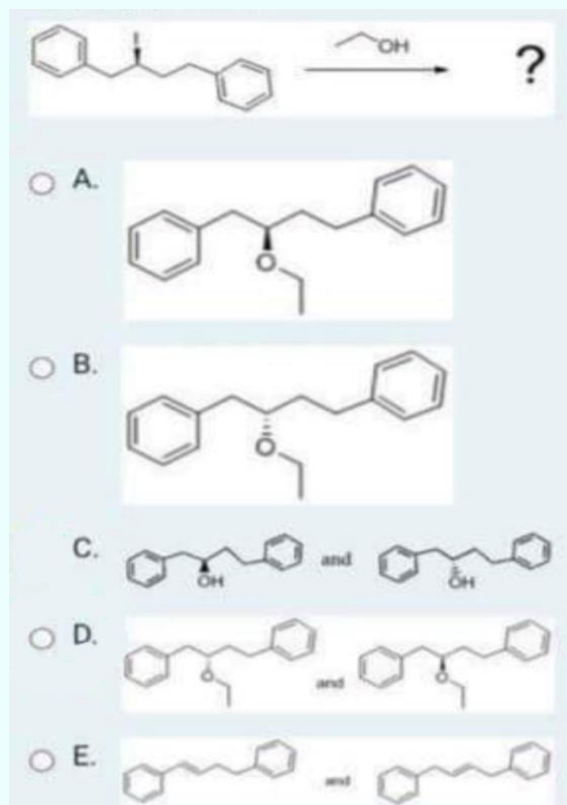
- a. A
- b. B
- c. C



Answer: b

Q56: What is the major product of the following reaction?

- a. A
- b. B
- c. C
- d. D
- e. E



Answer: d

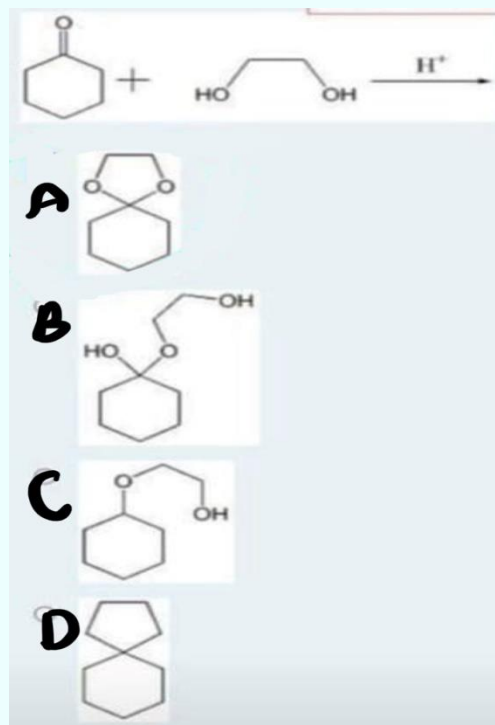


## Final 020

Q57: The product of the following reaction is:

- a. *A*
- b. *B*
- c. *C*
- d. *D*

Answer: a



Q58: Starting with *p*-bromonitrobenzene what sequence of reactions will produce *p*-deuterionitrobenzene?

- a. 1) Mg/ether 2) D<sub>2</sub>O
- b. 1) D<sub>2</sub>O 2) Mg/ether
- c. 1) Br<sub>2</sub>/AlBr<sub>3</sub>, 2) Mg/ether, 3) D<sub>2</sub>O
- d. 1) D<sub>2</sub>O, 2) Br<sub>2</sub>/AlBr<sub>3</sub>
- e. 1) H<sub>2</sub>SO<sub>4</sub>, 2) Mg/ether, 3) D<sub>2</sub>O

Answer: a

Q59: What products will be formed when cyclopentene is treated with *m*-chloroperbenzoic acid (peroxyacid) followed by methanol/H<sup>+</sup>?

- a. Cyclopentanecarboxylic acid
- b. 2-methoxycyclopentanol

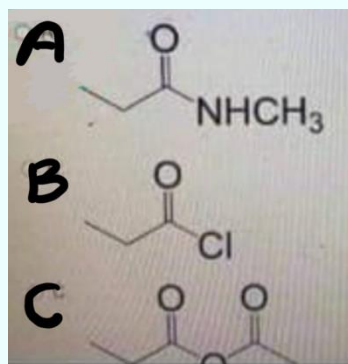
## Final 020

- c. 2-chlorocyclopentanol
- d. 1,2-cyclopentandiol
- e. Cyclopentene oxide

Answer:b

Q60: Which of the following is least reactive toward substitution with  $\text{CH}_3\text{MgBr}$ ?

- a. A
- b. B
- c. C



Answer:a

كل الشكر لسناء جعفر على حل هذه الأسئلة

بالتوفيق جميعا 😊