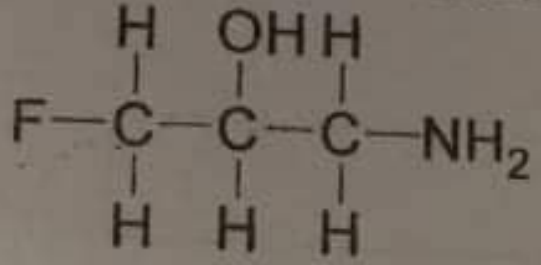
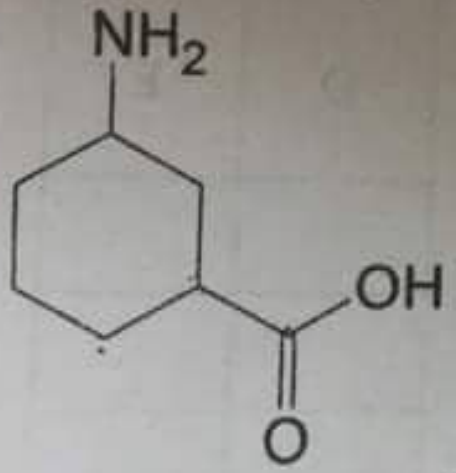
43- Outer shell electrons are called Valence electrons

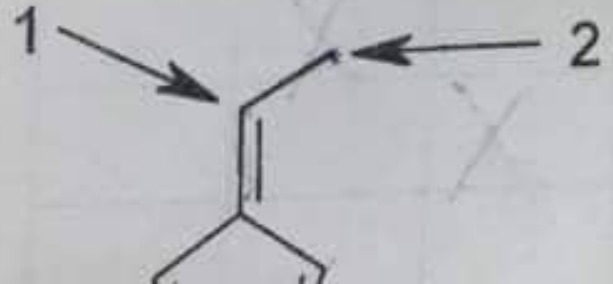
44- The most polar bond in the following molecule is Ionic C



45- The following molecule contains 8 carbon atoms and 10 hydr



46- The approximate bond angles of the indicated carbons are 1) 120.5, 2) 180,



2- The carbon has the correct orbital hybridization in which structures?

sp	sp^2	sp^2	sp
I	II	III	IV

a) II, IV, V b) II, III, IV c) I, II, III d) I, IV, V

3- Which of the following are pairs of contributing resonance structures?

I 

II 

III 

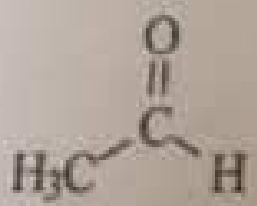
IV 

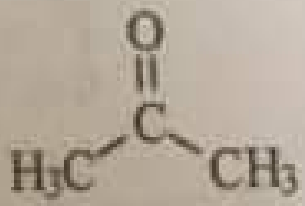
a) II, IV b) I, II, III ,c) III, IV d) II, III, ,IV

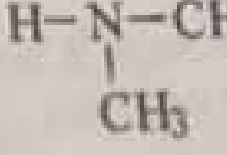
4- Which statement about resonance structures is false?

a) All contributing resonance structures must have the same number of valer
b) All contributing structures must obey the rules of covalent bonding.
c) The position of nuclei may change.
d) Third period atoms may have up to 12 electrons around them.

5- Which functional groups are named correctly?

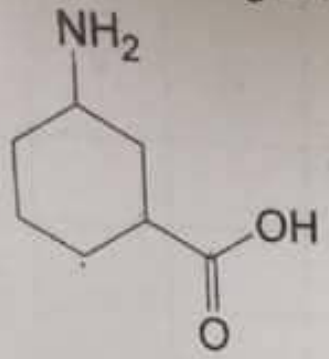




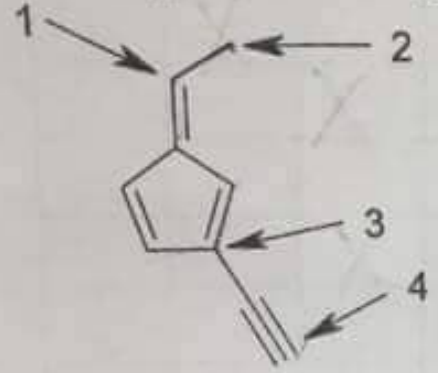


alcohol aldehyde ketone amine

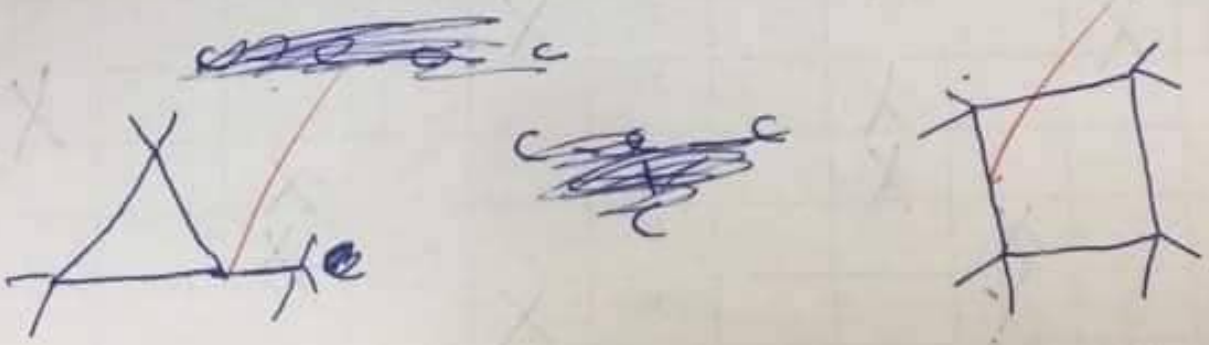
The following molecule contains 8 carbon atoms and 10 hydrogen atoms.



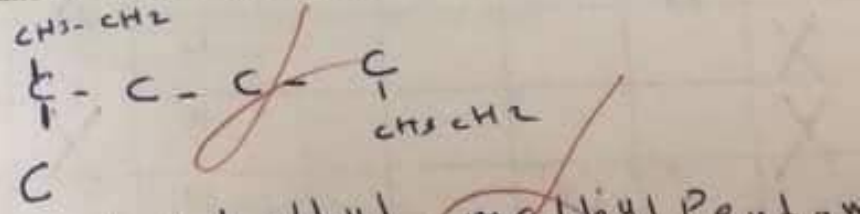
46- The approximate bond angles of the indicated carbons are 1) 109.5, 2) 180, 3) 120, 4) ___.



47- There are at least five molecules that have the molecular formula C_4H_8. Draw three of them



48- The name 1-methyl-4-ethylpentane is incorrect. Draw the structure of this alkane and name it corre



27- The correct structure for allyl bromide is :

• a- CH_2=$CHCH_2Br$

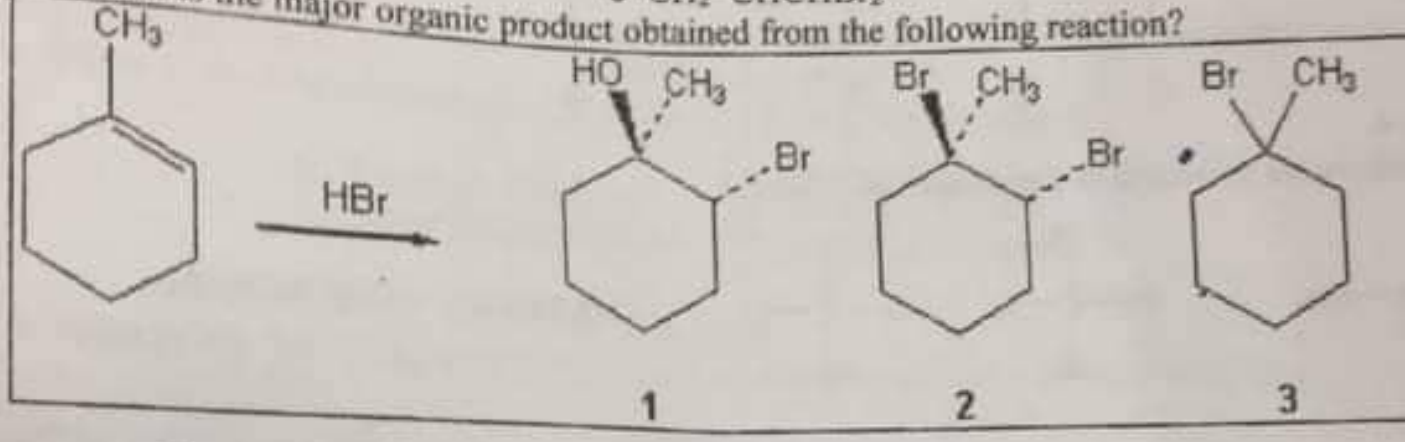
d- $BrCH$=$CHCH_3$

b- CH_2=$CHBr$

e- CH_2=$CHCHBr_2$

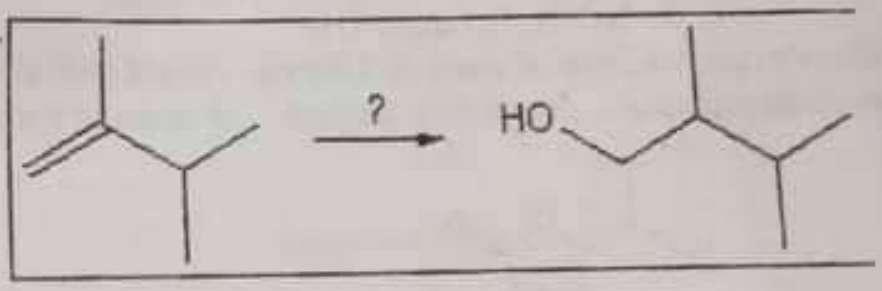
c- $BrCH$=$CHBr$

28- What is the major organic product obtained from the following reaction?



a-1 b-2 •c-3 d-4

29- What is the best choice of reagent(s) to perform the following transformation?



• a- BH_3, THF; followed by H_2O_2, H_2O, NaOH

b- $Hg(OAc)_2$ and H_2O ; followed by $NaBH_4$

c- H_2O, H_2SO_4

d- OsO_4; followed by $NaHSO_3$

38- The number of possible monobromination products, including *cis-trans* isomers, of methylcyclop

a- 2 b- 3 c- 4 d- 5 e- 6

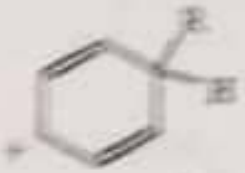
39- What type of carbocation will form from the addition of a H^+ to 2-methyl-2-butene?

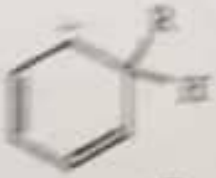
a- CH_3^+ b- 1° c- 2° d- 3° e- allyl

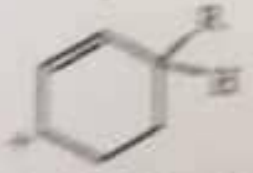
40- Upon ozonolysis which alkene will give only acetone, $(CH_3)_2C{=}O$

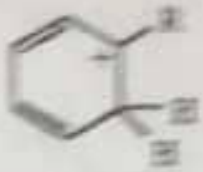
a- 2,3-dimethyl-2-butene b- 2,2-dimethyl-2-butene c- 3-hexene
d- 2-methyl-2-pentene e- 2-methyl-3-hexene

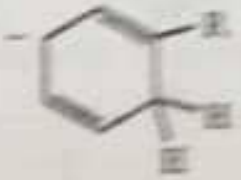
41- Which of the following is one of the resonance contributors of the intermediate produced in a Friedel alkylation of benzene?

I. 

II. 

III. 

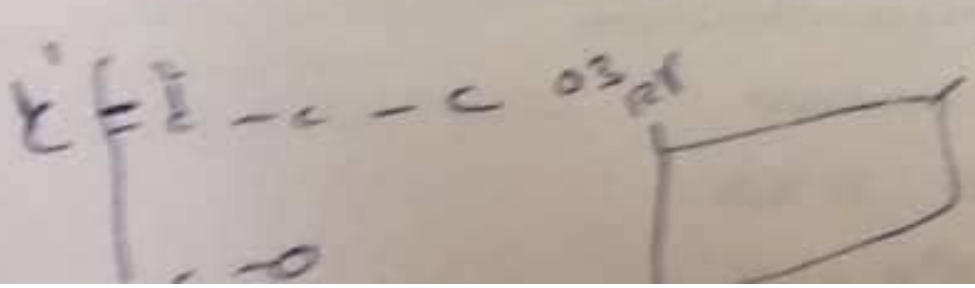
IV. 

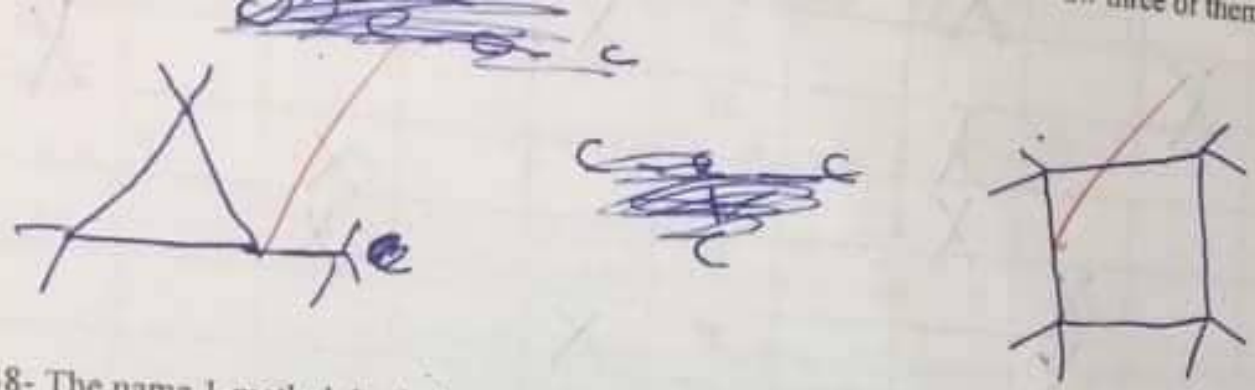
V. 

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

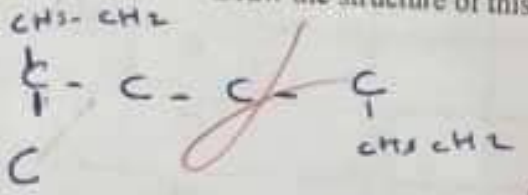
42- Which of the following reagents can be used to distinguish an alkene from an alkane?

a- Zn, H^+ b- H_2O c- Cl_2, hv d- Br_2, CCl_4 e- O_3, heat





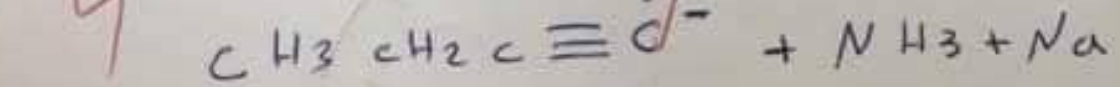
48- The name 1-methyl-4-ethylpentane is incorrect. Draw the structure of this alkane and name it correctly



1,4-diethyl-methylPentane

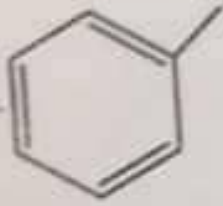
49- Provide the structure of the major organic product(s) in the reaction below.

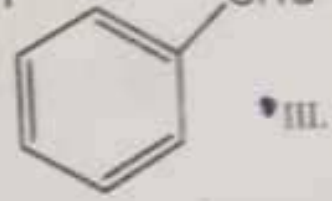
$$CH_3CH_2C{\equiv}CH \xrightarrow{NaNH_2} \xrightarrow{PhCH_2Br}$$

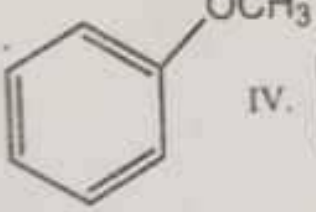


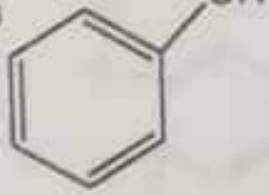
a) –Br b) –CN c) $-NO_2$ d) $-\overset{O}{\overset{\|}{C}}-H$ e) $-OCH_3$

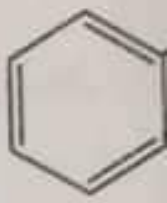
33) What is the structure of anisole?

I. 

II. 

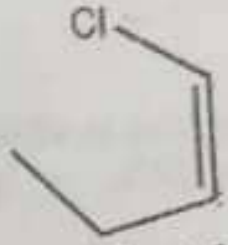
III. 

IV. 

V. 

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

34- What is the IUPAC name of



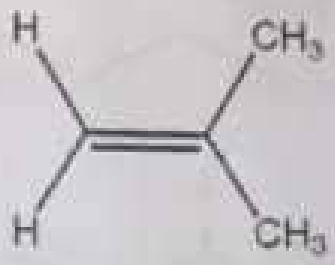
A) 1-chloro-2-pentene B) *trans*-4-chloro-3-butene C) *cis*-1-chloro-1-butene
D) *cis*-1-chloro-2-butene E) *trans*-1-chloro-1-propene

35- Which reagents react with an alkene in a Markovnikov orientation?

I. HBr II. H_2O/H_2SO_4 III. Br_2 IV. H_2/Pt

a) I, II b) III, IV c) II, IV d) II, III, IV e) I, IV

This molecule is the ___ isomer.



b. trans c. neither

lkenes are soluble in water.

e b. False

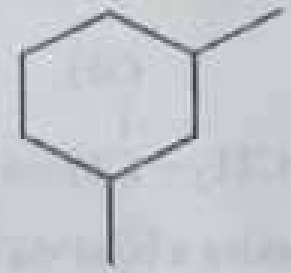
-Heptyne is an unsaturated compound.

ue b. False

cetylene is an alkene.

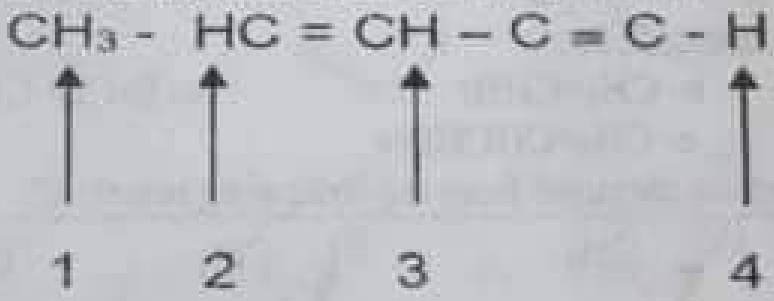
e b. False

entify the number of primary, secondary, and tertiary carbons, respectively, in the following



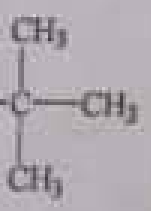
3, 1 (B) 4, 1, 1 (C) 2, 4, 2 (D) 2, 2, 4

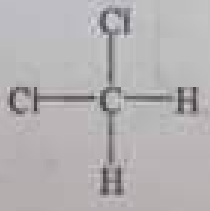
n allylic hydrogen is indicated at which position in the structure below?

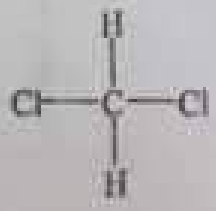


(B) 2 (C) 3 (D) 4

hich of the pairs below are structural or constitutional isomers?







$CH_3OCH_2CH_3$ CH_3C

1 2 3

a. 1 and 2 b. 1 and 3 c. only 3 d. only 2 e. only 1

ich reaction conditions would best convert 3-hexyne to *cis*-3-hexene?

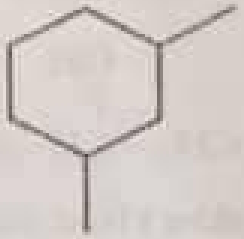
atalyst and H_2. b- Lindlar's Pd catalyst and H_2.

n liquid NH_3. d- $NaNH_2$ in liquid NH_3.

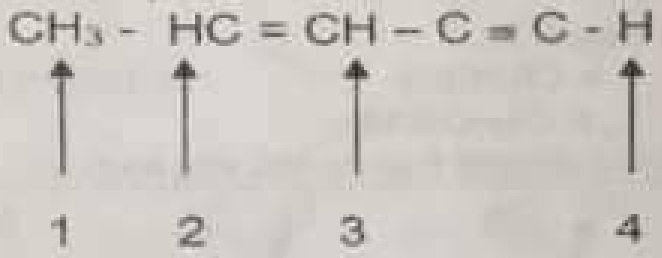
cording to Markovnikov's rule, addition of water to 1-butene should give a

ry alcohol b- secondary alcohol c- tertiary alcohol d- none of the above

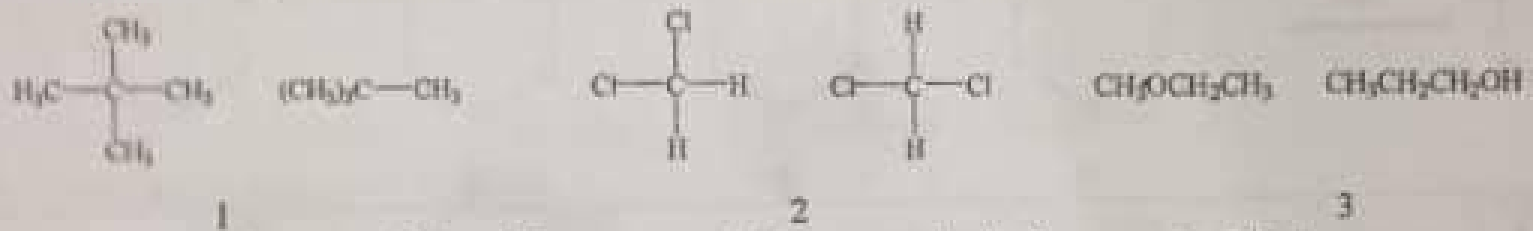
17- Acetylene is an alkene.
a. True b. False
18-Identify the number of primary, secondary, and tertiary carbons, respectively, in the following molecule



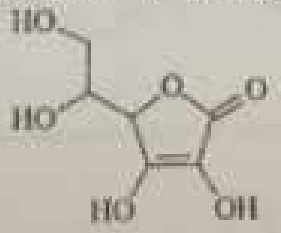
(A) 1, 3, 1 (B) 4, 1, 1 (C) 2, 4, 2 (D) 2, 2, 4
19- An allylic hydrogen is indicated at which position in the structure below?



(A) 1 (B) 2 (C) 3 (D) 4
20- Which of the pairs below are structural or constitutional isomers?



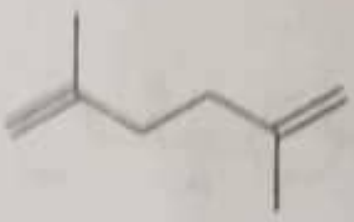
a. 1 and 2 b. 1 and 3 c. only 3 d. only 2 e. only 1
21- Which reaction conditions would best convert 3-hexyne to *cis*-3-hexene?
a- Pt catalyst and H_2. b- Lindlar's Pd catalyst and H_2.
c- Na in liquid NH_3. d- $NaNH_2$ in liquid NH_3.
22 - According to Markovnikov's rule, addition of water to 1-butene should give a
a- primary alcohol b- secondary alcohol c- tertiary alcohol d- none of the above



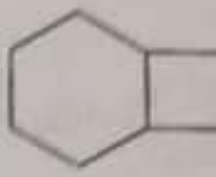
23-Given the structure of vitamin C
The molecular formula is
a) $C_6H_8O_4$ a) $C_6H_4O_6$ a) $C_6H_{10}O_6$ a) $C_6H_8O_5$ a) $C_5H_7O_6$

a)

b)



c)



d)

37- Which is the major product of the following reaction?

a) 1-chloro-4-nitrobenzene b) 1-chloro-3-nitrobenzene
c) 1-chloro-2-nitrobenzene d) a mixture of 1-chloro-4-nitrobenzene and 1-chloro-2-nit

38- The number of possible monobromination products, including *cis- trans* isomers, of methylcy

a- 2 b- 3 c- 4 d- 5 e- 6

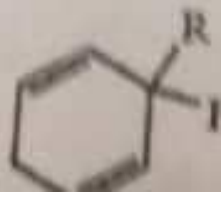
39- What type of carbocation will form from the addition of a H^+ to 2-methyl-2-butene?

a- CH_3^+ b- 1° c- 2° d- 3° e- allyl

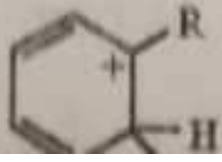
40- Upon ozonolysis which alkene will give only acetone, $(CH_3)_2C{=}O$

a- 2,3-dimethyl-2-butene b- 2,2-dimethyl-2-butene c- 3-hexene
d- 2-methyl-2-pentene e- 2-methyl-3-hexene

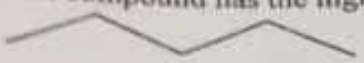
- Which of the following is one of the resonance contributors of the intermediate produced in a
xylation of benzene?

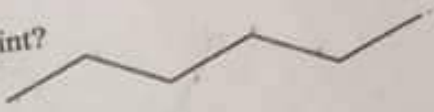


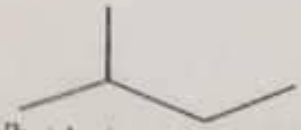
IV.



24- Which compound has the highest boiling point?

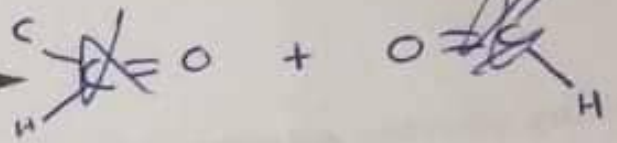
a- 

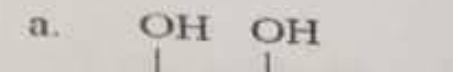
•b- 

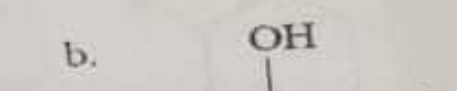
c- 

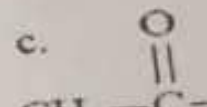
d- 

25- What is the product for this reaction?

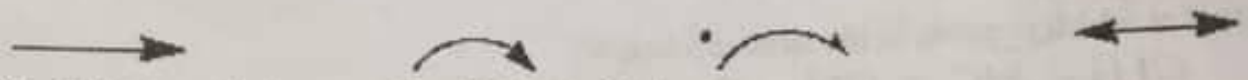
cis - 2-butene $\xrightarrow[2\text{- Zn / } H^+ /H_2O]{1\text{- } O_3}$ 

a. 

b. 

c. 

26- Circle the arrow that is used to indicate breaking a bond via homolytic cleavage

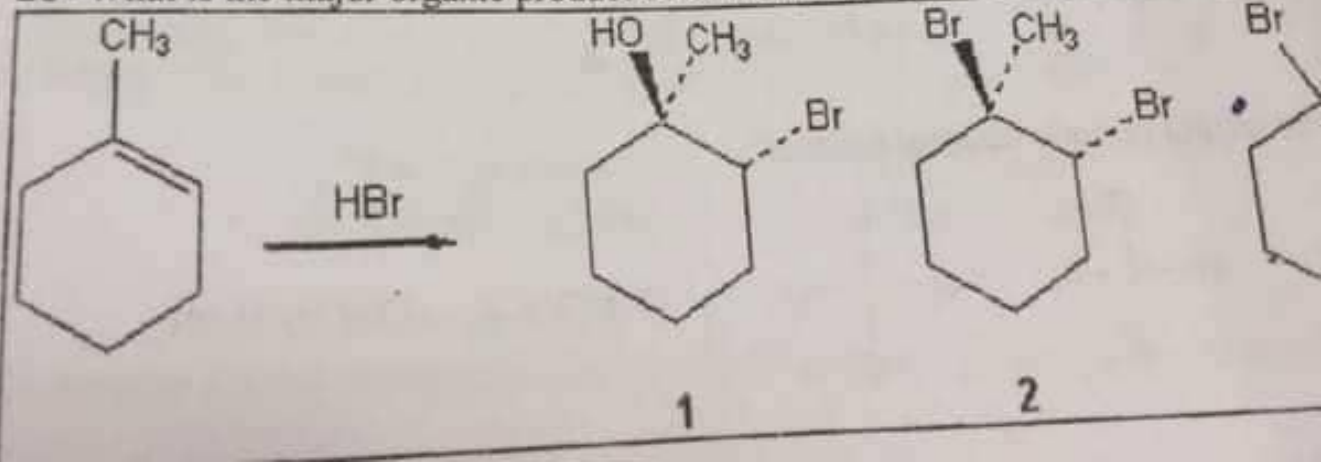


27- The correct structure for allyl bromide is :

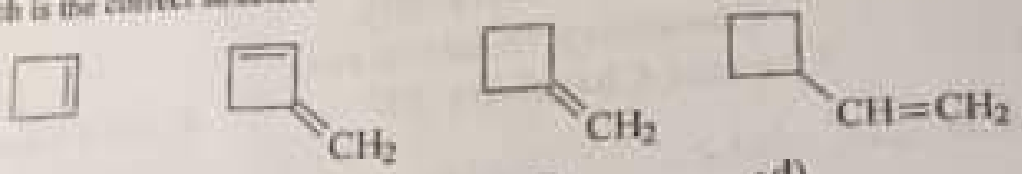
• a- CH_2=$CHCH_2Br$ b- CH_2=$CHBr$ c- BrCH=CHBr

d- BrCH=$CHCH_3$ e- CH_2=$CHCHBr_2$

28- What is the major organic product obtained from the following reaction?

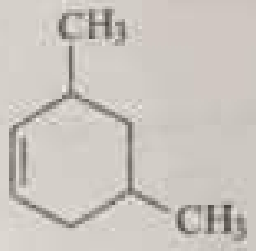


6- Which is the correct structure for vinylcyclobutane?



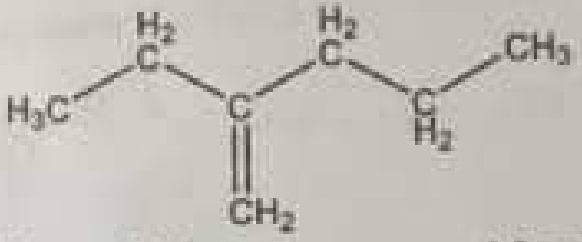
a) b) c) d)

7- Which is the correct name for the following compound?



a) 1,3-dimethylcyclohexene b) 2,4-dimethylcyclohexene
c) 3,5-dimethylcyclohexene d) 2,4-dimethyl-1-cyclohexene

8-Name the structure.



a) 2-ethyl-1-pentene b) 2-propyl-1-butene c) 3-methylenehexane
d) 3-methyl-3-hexene e) ethyl propyl ethene

9- Which of the following alkenes do not show cis-trans isomerization?

I) 2-methyl-2-hexene II) 1-chloro-1-butene
III) 1-methylcyclohexene IV) 2-methyl-3-hexene

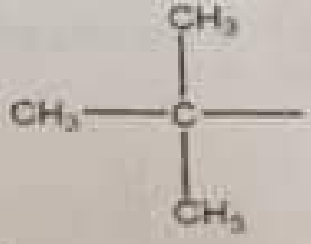
a) I, II b) III, IV c) II, III, IV d) I, III

10- Arrange the following molecules in order of increasing boiling point (lowest first).

I II III

a) I, II, IV, III b) IV, II, III, I c) III, IV, II, I d) I, II, III, IV

11- This substituent is called:



a. isopropyl b. isobutyl c. sec-butyl d. tert-butyl

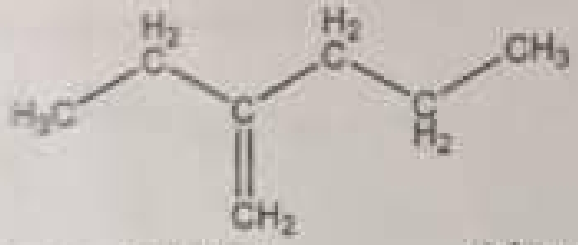
12- An alkane with 10 carbons will have _____ hydrogen atoms.

a. 10 b. 18 c. 20 d. 22

13- A cycloalkane with 10 carbons will have _____ hydrogen atoms.

a) 1,3-dimethylcyclohexene b) 2,4-dimethylcyclohexene
c) 3,5-dimethylcyclohexene d) 2,4-dimethyl-1-cyclohexene

8-Name the structure.



a) 2-ethyl-1-pentene b) 2-propyl-1-butene c) 3-methylenehexane
d) 3-methyl-3-hexene e) ethyl propyl ethene

9- Which of the following alkenes do not show cis-trans isomerization?

I) 2-methyl-2-hexene II) 1-chloro-1-butene
III) 1-methylcyclohexene IV) 2-methyl-3-hexene

a) I, II b) III, IV c) II, III, IV d) I, III

10- Arrange the following molecules in order of increasing boiling point (lowest first).

I II III

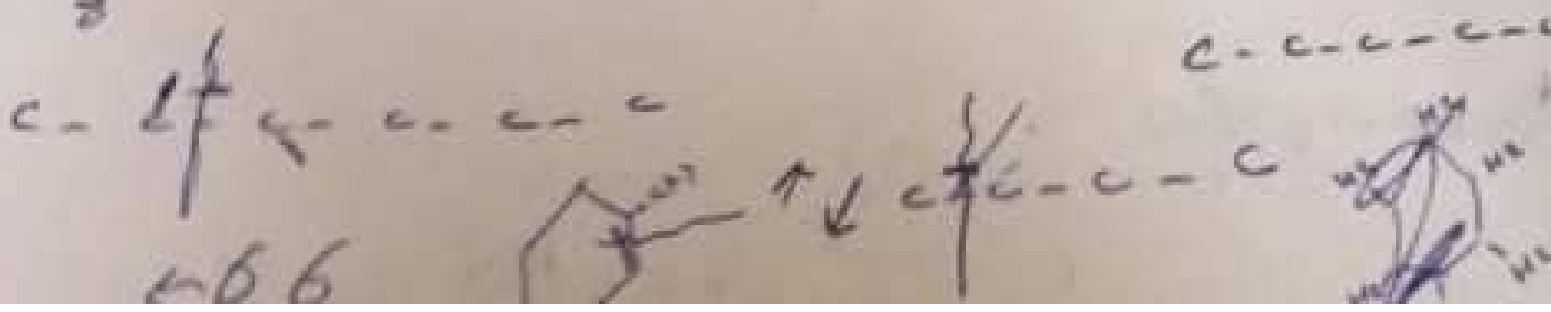
a) I, II, IV, III b) IV, II, III, I c) III, IV, II, I d) I, II, III, IV

11- This substituent is called:

a. isopropyl b. isobutyl c. sec-butyl d. tert-butyl

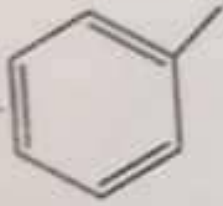
12- An alkane with 10 carbons will have _____ hydrogen atoms.
a. 10 b. 18 c. 20 d. 22

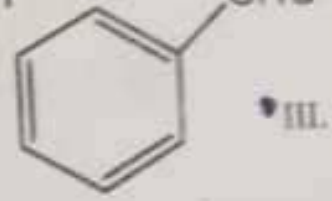
13- A cycloalkane with 10 carbons will have _____ hydrogen atoms.
a. 10 b. 18 c. 20 d. 22

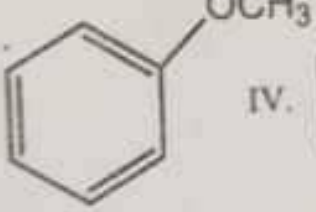


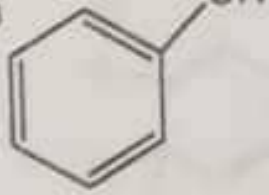
a) –Br b) –CN c) $-NO_2$ d) $-\overset{O}{\overset{\|}{C}}-H$ e) $-OCH_3$

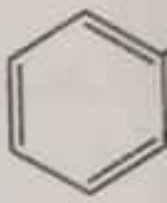
33) What is the structure of anisole?

I. 

II. 

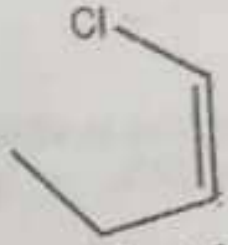
III. 

IV. 

V. 

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

34- What is the IUPAC name of

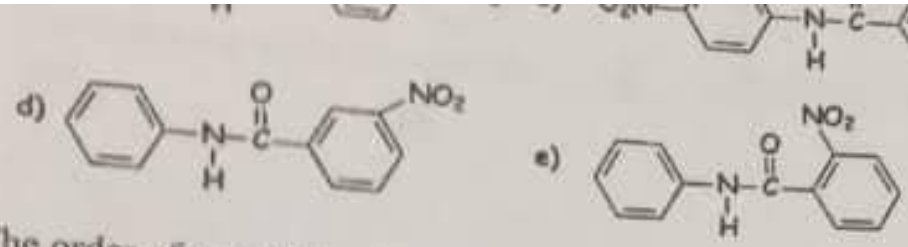


A) 1-chloro-2-pentene B) *trans*-4-chloro-3-butene C) *cis*-1-chloro-1-butene
D) *cis*-1-chloro-2-butene E) *trans*-1-chloro-1-propene

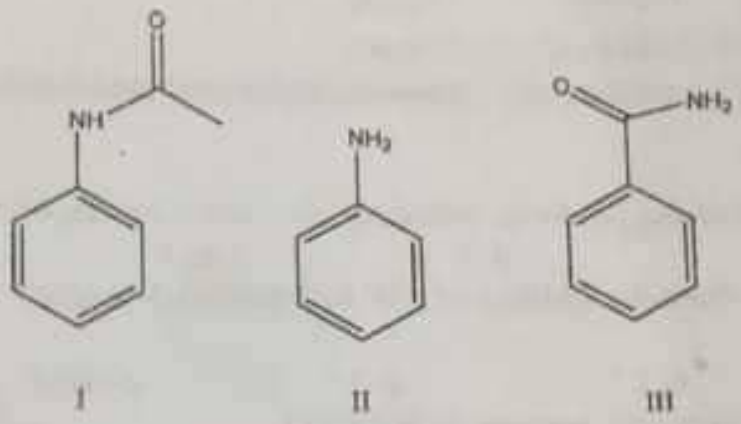
35- Which reagents react with an alkene in a Markovnikov orientation?

I. HBr II. H_2O/H_2SO_4 III. Br_2 IV. H_2/Pt

a) I, II b) III, IV c) II, IV d) II, III, IV e) I, IV



31-The order of reactivity of the following compounds towards HNO_3 / H_2SO_4 is:



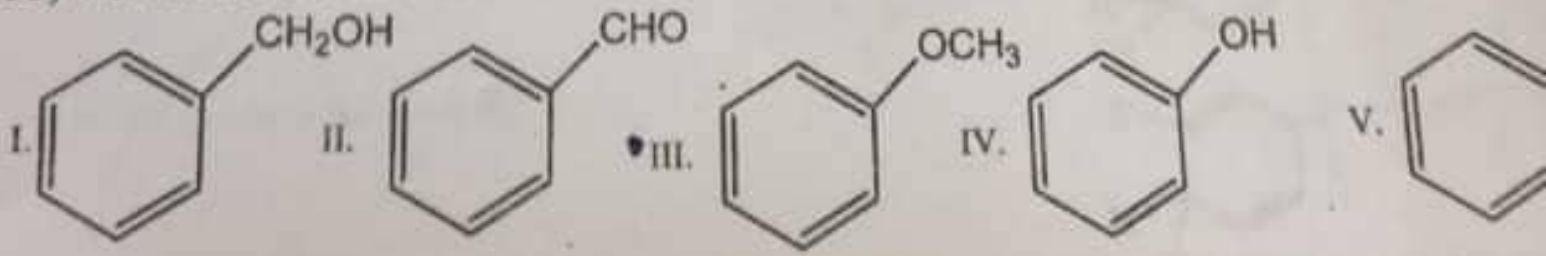
I II III

a) I > II> III b) I > III> II c) II > I> III d) II > III> I e) III > I> II

32-In an electrophilic aromatic substitution reaction, which group is both *ortho, para* directing an deactivating?

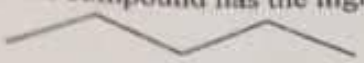
a) –Br b) –CN c) $-NO_2$ d) $-\overset{O}{\overset{\|}{C}}-H$ e) $-OCH_3$

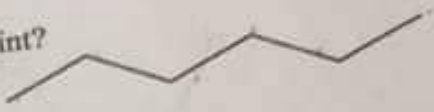
33) What is the structure of anisole?

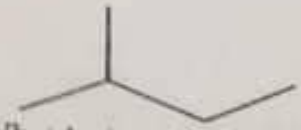


I B)II C) III D) IV E) V

24- Which compound has the highest boiling point?

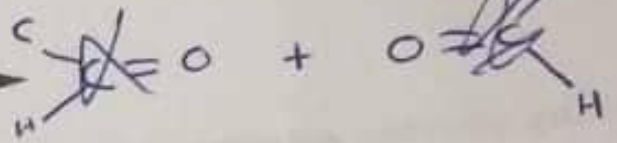
a- 

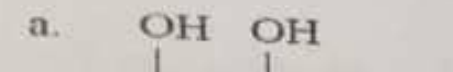
•b- 

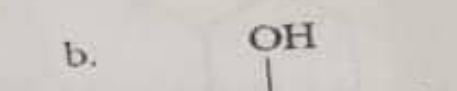
c- 

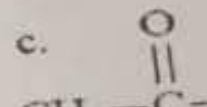
d- 

25- What is the product for this reaction?

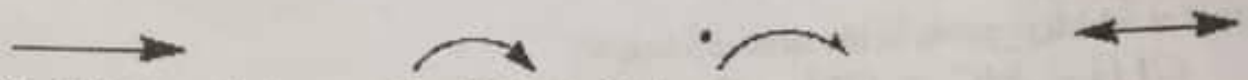
cis - 2-butene $\xrightarrow[2\text{- Zn / } H^+ /H_2O]{1\text{- } O_3}$ 

a. 

b. 

c. 

26- Circle the arrow that is used to indicate breaking a bond via homolytic cleavage

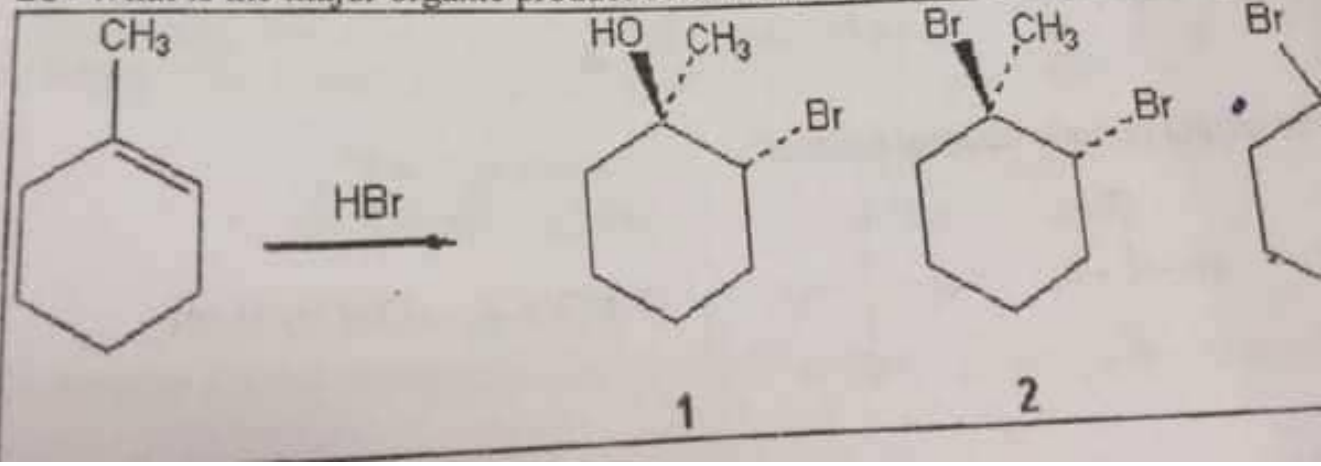


27- The correct structure for allyl bromide is :

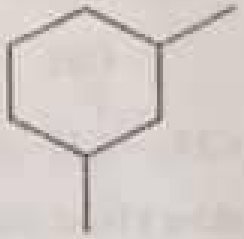
• a- CH_2=$CHCH_2Br$ b- CH_2=$CHBr$ c- BrCH=CHBr

d- BrCH=$CHCH_3$ e- CH_2=$CHCHBr_2$

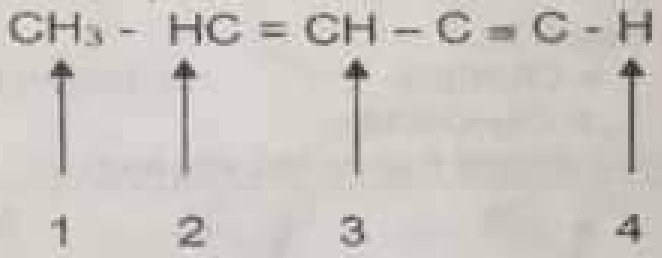
28- What is the major organic product obtained from the following reaction?



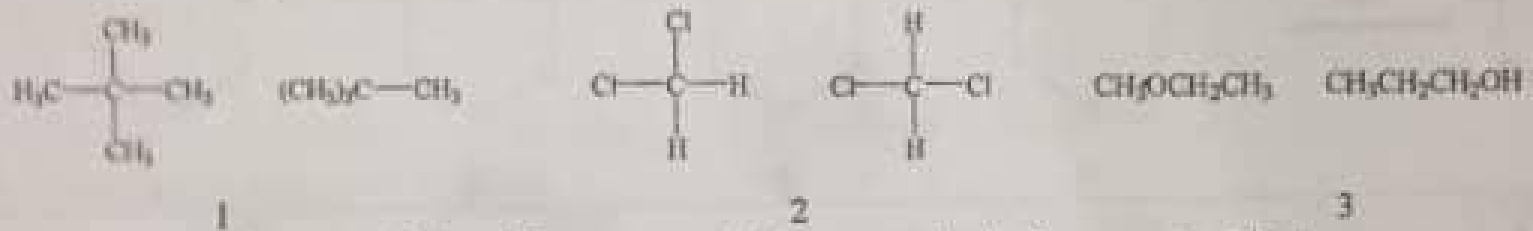
17- Acetylene is an alkene.
a. True b. False
18-Identify the number of primary, secondary, and tertiary carbons, respectively, in the following molecule



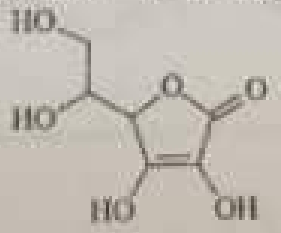
(A) 1, 3, 1 (B) 4, 1, 1 (C) 2, 4, 2 (D) 2, 2, 4
19- An allylic hydrogen is indicated at which position in the structure below?



(A) 1 (B) 2 (C) 3 (D) 4
20- Which of the pairs below are structural or constitutional isomers?



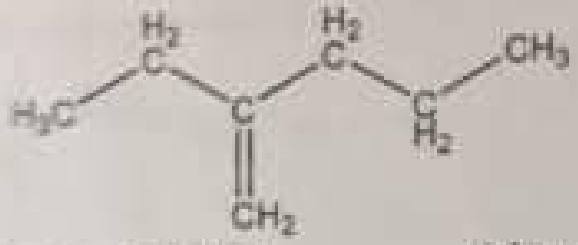
a. 1 and 2 b. 1 and 3 c. only 3 d. only 2 e. only 1
21- Which reaction conditions would best convert 3-hexyne to *cis*-3-hexene?
a- Pt catalyst and H_2. b- Lindlar's Pd catalyst and H_2.
c- Na in liquid NH_3. d- $NaNH_2$ in liquid NH_3.
22 - According to Markovnikov's rule, addition of water to 1-butene should give a
a- primary alcohol b- secondary alcohol c- tertiary alcohol d- none of the above



23-Given the structure of vitamin C
The molecular formula is
a) $C_6H_8O_4$ a) $C_6H_4O_6$ a) $C_6H_{10}O_6$ a) $C_6H_8O_5$ a) $C_5H_7O_6$

a) 1,3-dimethylcyclohexene b) 2,4-dimethylcyclohexene
c) 3,5-dimethylcyclohexene d) 2,4-dimethyl-1-cyclohexene

8-Name the structure.



a) 2-ethyl-1-pentene b) 2-propyl-1-butene c) 3-methylenehexane
d) 3-methyl-3-hexene e) ethyl propyl ethene

9- Which of the following alkenes do not show cis-trans isomerization?

I) 2-methyl-2-hexene II) 1-chloro-1-butene
III) 1-methylcyclohexene IV) 2-methyl-3-hexene

a) I, II b) III, IV c) II, III, IV d) I, III

10- Arrange the following molecules in order of increasing boiling point (lowest first).

I II III

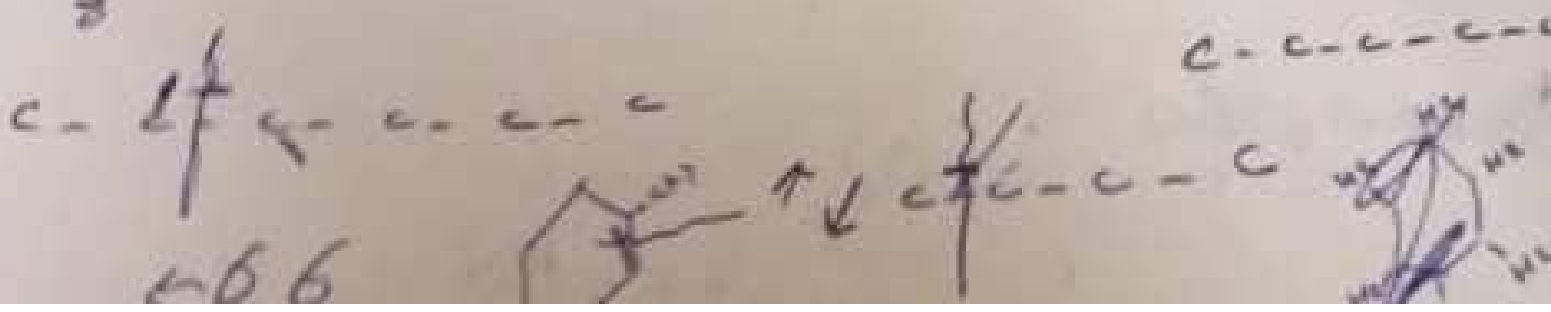
a) I, II, IV, III b) IV, II, III, I c) III, IV, II, I d) I, II, III, IV

11- This substituent is called:

a. isopropyl b. isobutyl c. sec-butyl d. tert-butyl

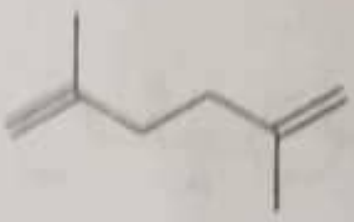
12- An alkane with 10 carbons will have _____ hydrogen atoms.
a. 10 b. 18 c. 20 d. 22

13- A cycloalkane with 10 carbons will have _____ hydrogen atoms.
a. 10 b. 18 c. 20 d. 22

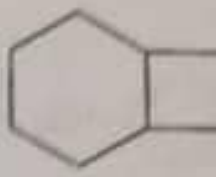


a)

b)



c)



d)

37- Which is the major product of the following reaction?

a) 1-chloro-4-nitrobenzene b) 1-chloro-3-nitrobenzene
c) 1-chloro-2-nitrobenzene d) a mixture of 1-chloro-4-nitrobenzene and 1-chloro-2-nit

38- The number of possible monobromination products, including *cis- trans* isomers, of methylcy

a- 2 b- 3 c- 4 d- 5 e- 6

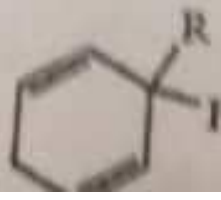
39- What type of carbocation will form from the addition of a H^+ to 2-methyl-2-butene?

a- CH_3^+ b- 1° c- 2° d- 3° e- allyl

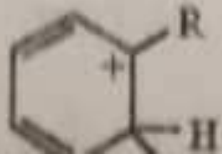
40- Upon ozonolysis which alkene will give only acetone, $(CH_3)_2C{=}O$

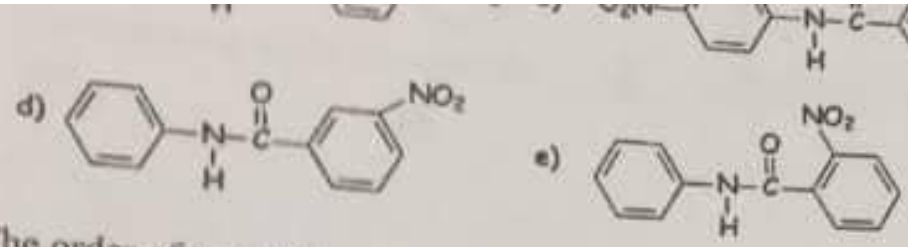
a- 2,3-dimethyl-2-butene b- 2,2-dimethyl-2-butene c- 3-hexene
d- 2-methyl-2-pentene e- 2-methyl-3-hexene

- Which of the following is one of the resonance contributors of the intermediate produced in a
xylation of benzene?

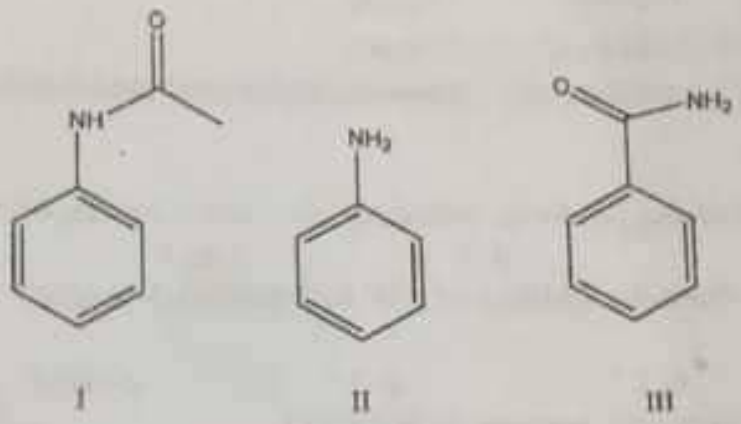


IV.





31-The order of reactivity of the following compounds towards HNO_3 / H_2SO_4 is:



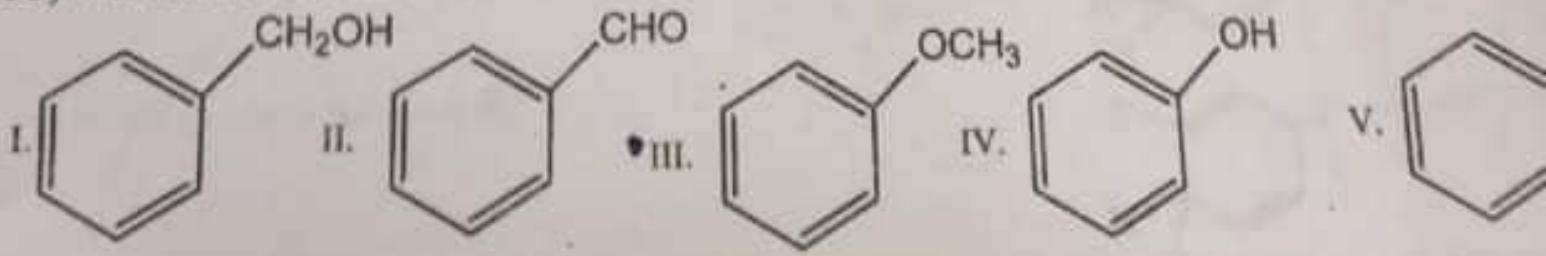
I II III

a) I > II> III b) I > III> II c) II > I> III d) II > III> I e) III > I> II

32-In an electrophilic aromatic substitution reaction, which group is both *ortho, para* directing an deactivating?

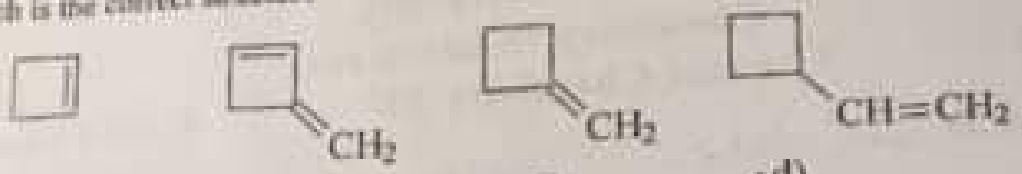
a) –Br b) –CN c) $-NO_2$ d) $-\overset{O}{\overset{\|}{C}}-H$ e) $-OCH_3$

33) What is the structure of anisole?



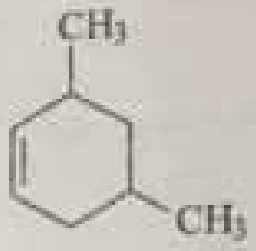
I B)II C) III D) IV E) V

6- Which is the correct structure for vinylcyclobutane?



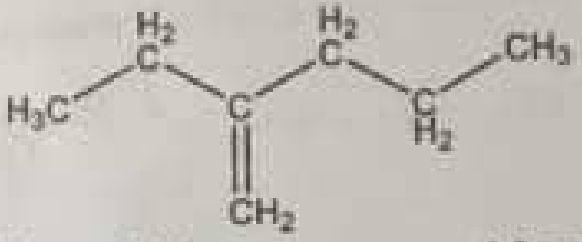
a) b) c) d)

7- Which is the correct name for the following compound?



a) 1,3-dimethylcyclohexene b) 2,4-dimethylcyclohexene
c) 3,5-dimethylcyclohexene d) 2,4-dimethyl-1-cyclohexene

8-Name the structure.



a) 2-ethyl-1-pentene b) 2-propyl-1-butene c) 3-methylenehexane
d) 3-methyl-3-hexene e) ethyl propyl ethene

9- Which of the following alkenes do not show cis-trans isomerization?

I) 2-methyl-2-hexene II) 1-chloro-1-butene
III) 1-methylcyclohexene IV) 2-methyl-3-hexene

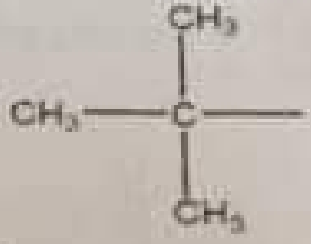
a) I, II b) III, IV c) II, III, IV d) I, III

10- Arrange the following molecules in order of increasing boiling point (lowest first).

I II III

a) I, II, IV, III b) IV, II, III, I c) III, IV, II, I d) I, II, III, IV

11- This substituent is called:



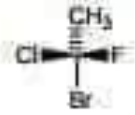
a. isopropyl b. isobutyl c. sec-butyl d. tert-butyl

12- An alkane with 10 carbons will have _____ hydrogen atoms.

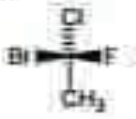
a. 10 b. 18 c. 20 d. 22

13- A cycloalkane with 10 carbons will have _____ hydrogen atoms.

16. The molecules below are:



I



II

A) constitutional isomers.
B) enantiomers.
C) diastereomers.
D) identical.
E) None of these

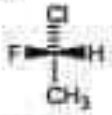
17. The molecules below are:

A) constitutional isomers.
B) enantiomers.
C) diastereomers.
D) identical.
E) None of these

18. The molecules shown are:

A) constitutional isomers.
B) enantiomers.
C) diastereomers.
D) identical.
E) None of these

19. The molecules below are:



A) constitutional isomers.
B) enantiomers.
C) diastereomers.
D) identical.
E) None of these

Electronic Structure and Molecular Geometry

1.32. What is the percent *s* character in an sp^3 hybridized orbital?

*a. 25% b. 33% c. 50% d. 67% e. 75%

1.33. The maximum number of electrons that a molecular orbital can contain is:

a. 1 *b. 2 c. 3 d. 4 e. 5

1.34. The approximate H–C–H bond angle in methane is

a. 60° b. 90° *c. 109.5° d. 120° e. 180°

1.35. The Lewis structure of methane is

The approximate H–C–H bond angle in methane is

a. 60° b. 90° *c. 109.5° d. 120° e. 180°

Classification of Organic Compounds

1.36. Which of the following molecules is carbocyclic?

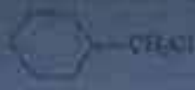
a. $CH_3CH_2CH_3$ *b.  c. CH_3CHCH_3 with CH_3

d.  e. $CH_3OCH_2CH_3$

1.37. Which of the following molecules contain the same functional group?

CH_3OH (1) CH_3OCH_3 (2) CH_3CH_2OH (3) $CH_3CH_2OCH_2CH_3$ (4)

a. 1, 2 and 3 *b. 1, 3 and 4 c. 1 and 2 d. 2 and 4 e. 3 and 4

I  + NaOH

II  + CH_3OH $\xrightarrow{H_2O}$

III  + $CH_3\overset{\ominus}{C}N$ $\xrightarrow{DMSO}$

IV  + NaI $\xrightarrow{DMSO}$

a) I, II b) II, III c) III, IV d) I, IV

11) Which statements apply to an S_N1 reaction?

I) The rate limiting step of the reaction involves the alkyl halide and the nucleophile

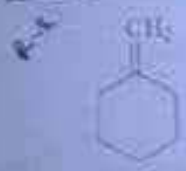
II) The order of reactivity is methyl > 1° > 2° > 3°

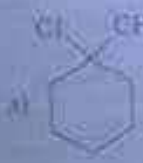
III) The rate limiting step of the reaction involves only the alkyl halide

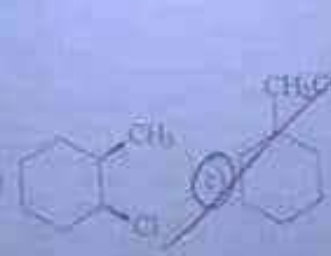
IV) There is an intermediate carbocation

a) I, II b) III, IV c) I, IV d) III

12) Which alkyl halide leads to the product shown, in an E2 reaction?

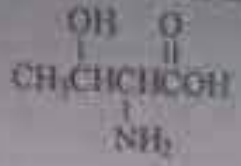


a) 

b) 

c) 

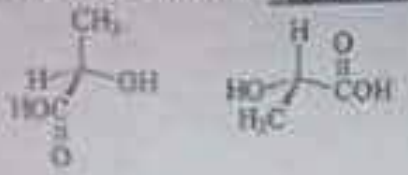
Q16. How many stereoisomers are possible for the following structure?



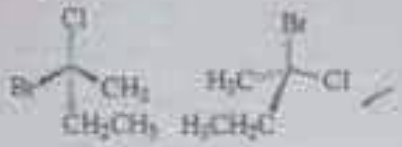
a) 1
b) 2
c) 3
d) 4

Q17. Which pair of structures are enantiomers?

I.



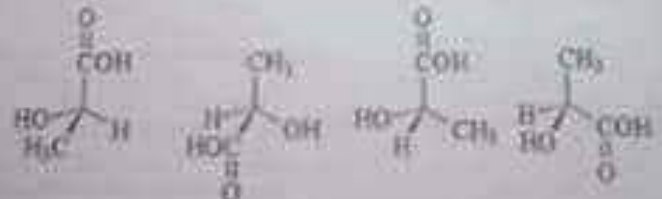
II.



III.

a) I, II
b) II, III
c) I, III
d) I, II, III

Q18. Which forms of lactic acid are R forms?



I. II. III. IV

a) I, II
b) III, IV
c) I, III
d) II, IV

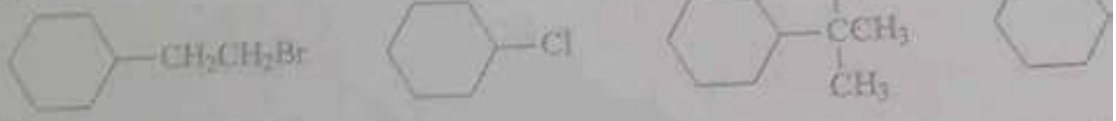
1- How many stereoisomers are possible for 2,3-butanediol?

a) 1 b) 2 c) 3 d) 4

2- What is the relationship between these two structures?

a) identical structures b) enantiomers c) diastereomers d) constitutional isomer

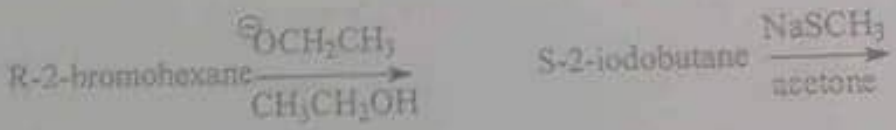
3- Arrange the alkyl halides in order of increasing reactivity in an S_N2 reaction with KI in acetone (least first).



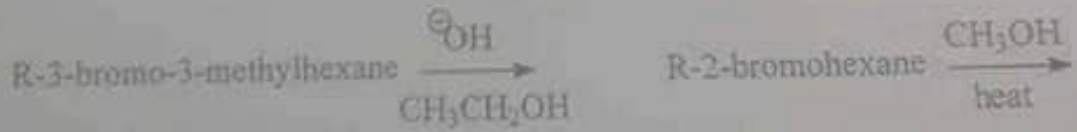
I II III IV

a) I, IV, III, II b) IV, I, III, II c) II, III, I, IV d) III, II, IV,

4- Which reactions will proceed with inversion of configuration?



I. II.



III. IV.

a) I, II b) III, IV c) II, III d) I, IV

5- Which statements apply to an S_N2 reaction?

I) The rate limiting step of the reaction involves the alkyl halide and th nucleophile.

II) The order of reactivity is methyl > 1°>2°>3°.

III) The rate limiting step of the reaction involves only the alkyl halide.

IV) There is an intermediate carbocation.

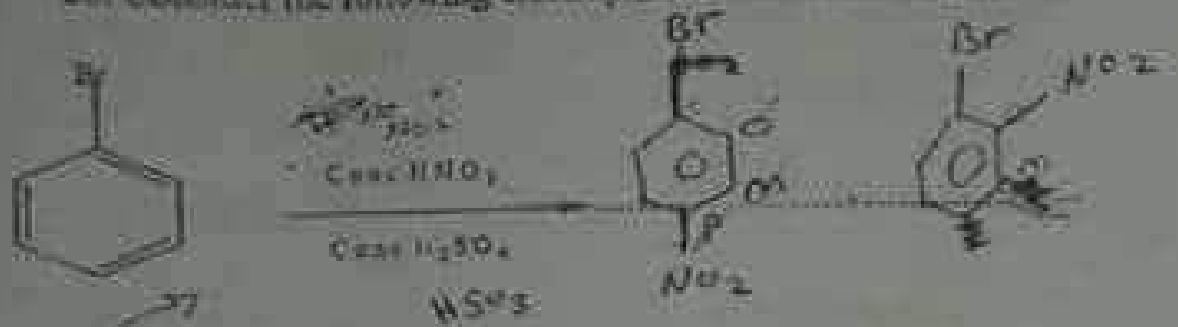
a) I, II b) III, IV c) I, IV d) II, IV

17. In crystallization experiment, insoluble material in hot solution can be removed by---
Suction filtration

18. A mixture of chloroform (b.p = 61°C) and n-hexane (b.p = 59°C) can be separated by ---------- distillation

19. The color of bromine/CCl_4 reagent changes from ---------- to ----------
upon addition of an alkene

20. Consider the following electrophilic aromatic substitution reaction below:



1- Complete the above reaction

2- What is the electrophile that produces during the reaction?

NO_2^+

3- Write a detailed mechanism for this reaction

hich of the following statements about ethene, C_2H_2, is/are correct?

e H-C-H bond angles are approximately 109.5°. B) The hydrogen atoms are no

al of five sigma bonds.

D) The carbon atoms are sp^2 hybridized

e H-C-H bond angles are approximately 180°.

en considering electrophilic aromatic substitution reactions the halides are descr

o/para directing and activating

b) *Ortho/para* directing and deactivating

directing and activating

d) *Meta* directing and deactivating

h of the following skeletal structures is an *accurate and complete* representatio

b-

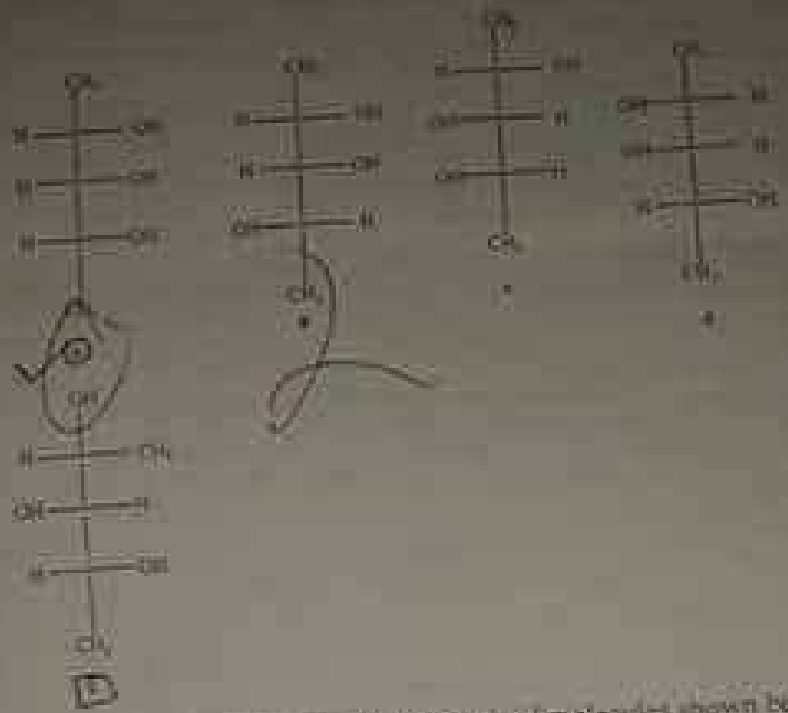
c-

(d) None

of the following synthetic procedures would be likely to be successful in ma

nzene?

5. Which one of the following structure represent a meso compound?



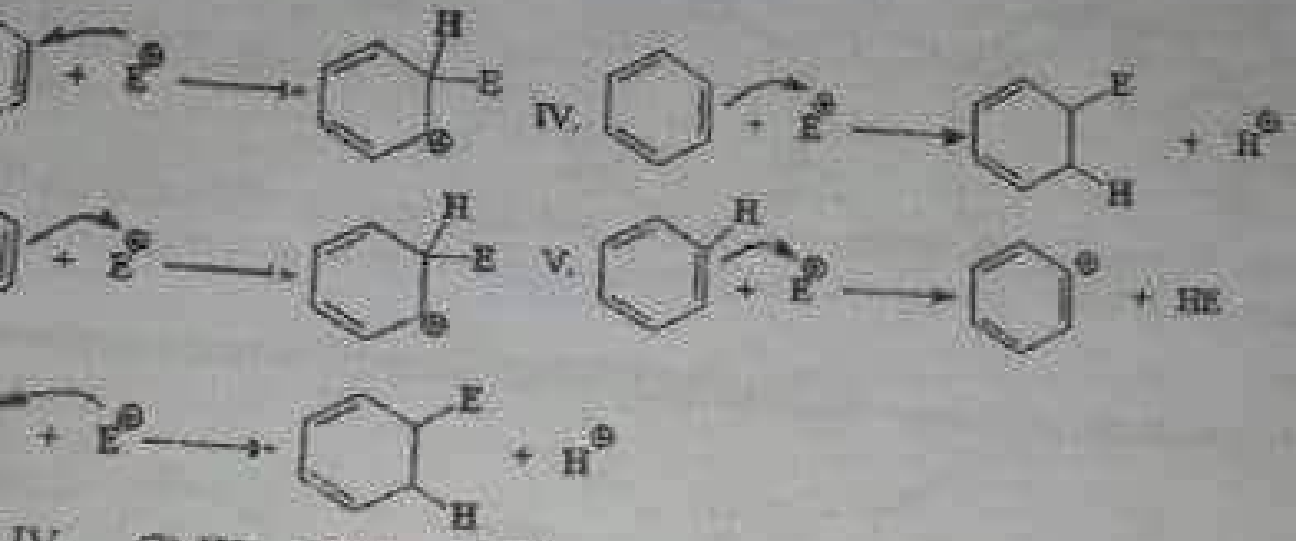
6. Which of the following statements about the pair of molecules shown below is not true?

a. They have the same boiling point.
b. One rotates the plane polarized light in opposite direction from the other.
c. They have the same density.
d. One rotates plane polarized light a different number of degrees than the other.
e. They are mirror images of each other.

7. Enantiomers may differ in the following property:

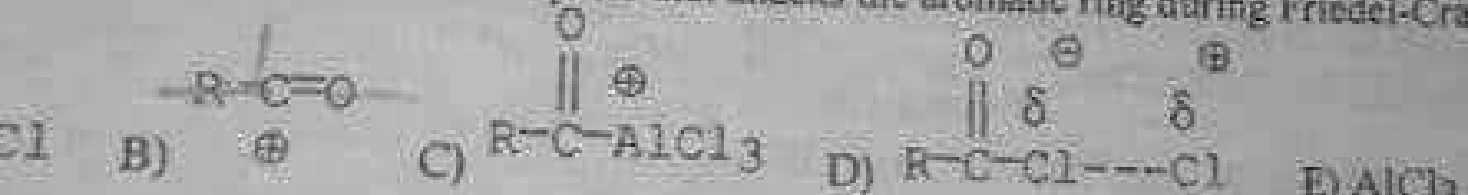
a. the rate which they react with a chiral reagent.
b. boiling point.
c. Melting point.
d. Number of degrees they rotate plane polarized light.
e. Soubility in water.

ich of the following is most likely to be the first step in the general mechanism for electrophilic
tion reactions?



IV C) III D) II E) V

of the following is the electrophile that attacks the aromatic ring during Friedel-Crafts acy



Cl B) C) D) E) $AlCl_3$