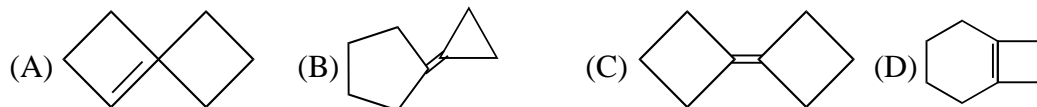
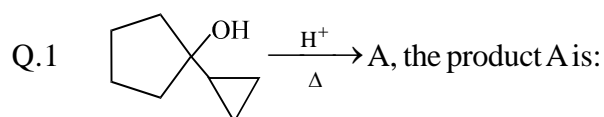


QUESTION BANK

GOC

EXERCISE-I

(Choose the correct option. Only one is correct)



Q.2 Which carbocation is least likely to form as intermediate?



Q.3 2-chloropentane on halogenation with chlorine gives 2,3, dichloropentane. What will be the structure of free radical species form in the reaction?

(A) Planar (B) Trigonal planar (C) Square planar (D) Pyramidal

Q.4 What will be major product, when 2-methyl butane undergoes bromination in presence of light?

(A) 1-bromo-2-methyl butane (B) 2-bromo-2-methyl butane
(C) 2-bromo-3-methyl butane (D) 1-bromo-3-methyl butane

Q.5 The smallest compound, which on photochlorination produces diastereomers is

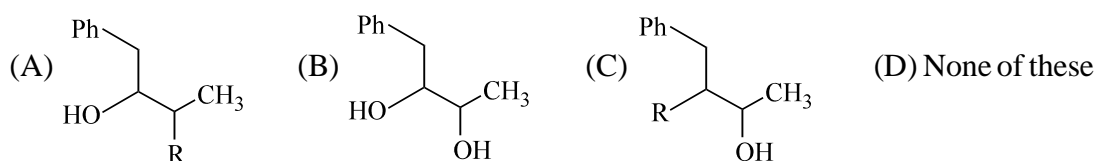
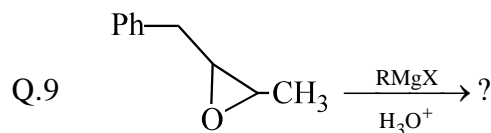
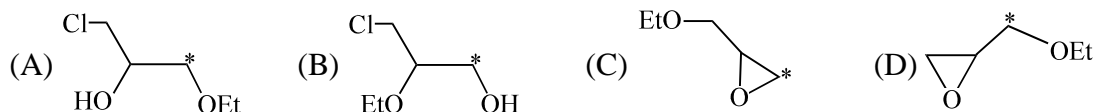
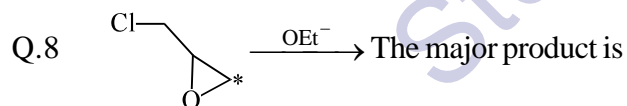
(A) 3-methyl, 3-chloro hexane (B) 2-chloro butane
(C) 1-bromo propane (D) 1-bromo-3-methyl butane

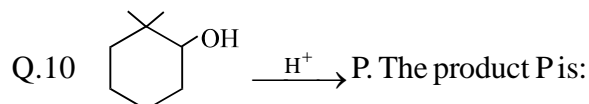
Q.6 Which of the following will give two isomeric monochloro derivatives?

(A) 2,3-dimethyl butane (B) n-hexane (C) Isopentane (D) Butane

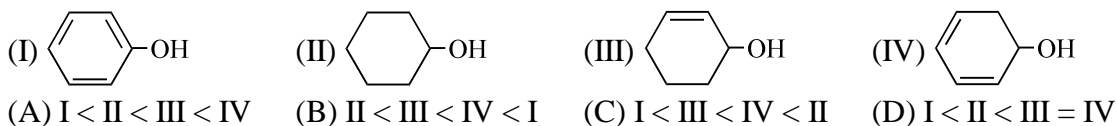
Q.7 How many isomers can be produced from the molecular formula $C_4H_{10}O$?

(A) 8 (B) 7 (C) 6 (D) 5

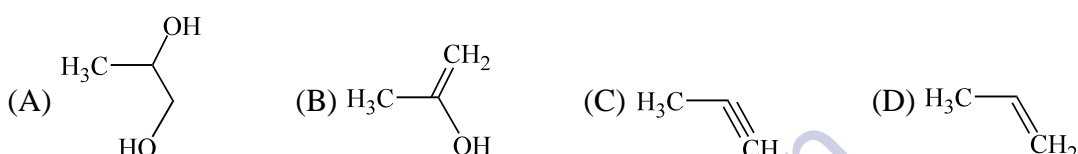
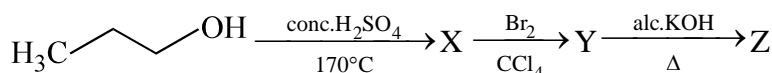




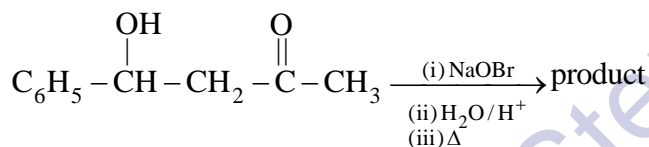
Q.11 Among the given compounds, the correct dehydration order is:



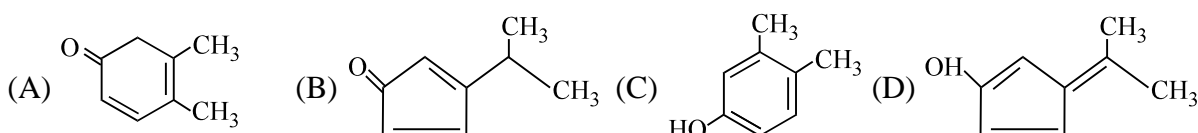
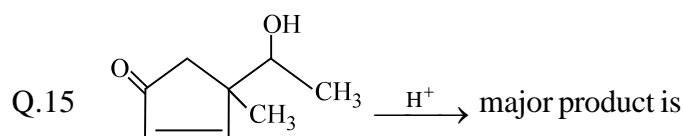
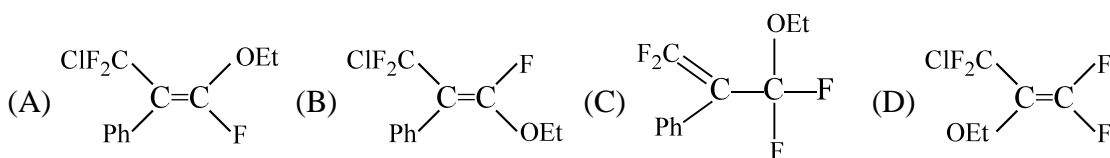
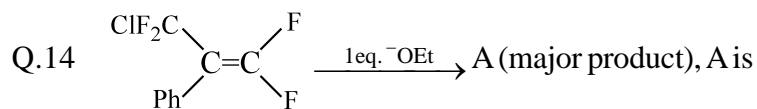
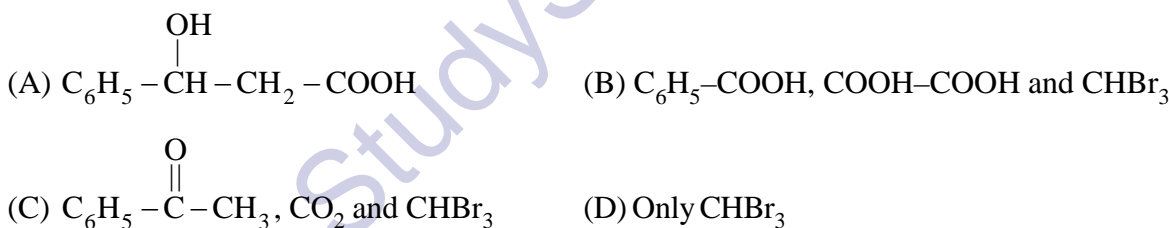
Q.12 Identify Z in the following series of reaction:



Q.13 In the reaction sequence

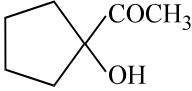


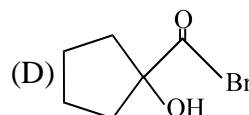
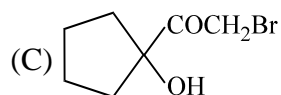
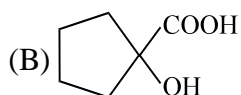
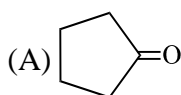
product will be

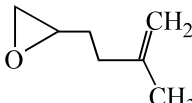


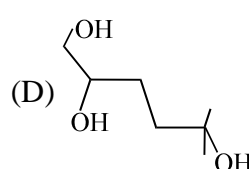
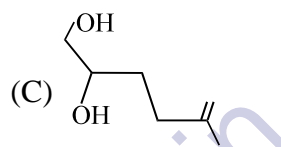
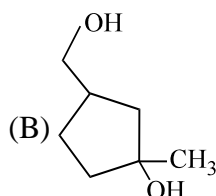
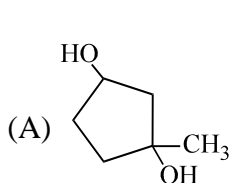
Q.16 HBr reacts fastest with
 (A) 2-methyl butane-2-ol
 (C) Butane-1-ol

(B) 3-methyl butane-2-ol
 (D) 2-methyl butane-1-ol

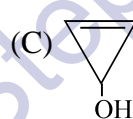
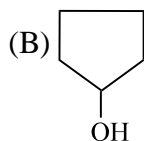
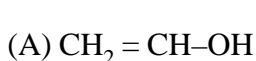
Q.17  $\xrightarrow{\text{NaOBr}}$ Product
 The product is



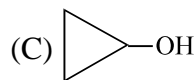
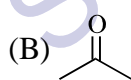
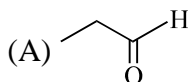
Q.18  $\xrightarrow{\text{H}_3\text{O}^+}$ A, A is



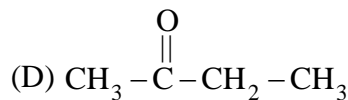
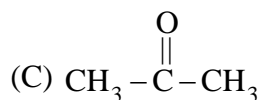
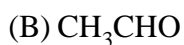
Q.19 Which one of the following alcohol will undergo acid catalysed dehydration with greatest ease by E_1 mechanism?

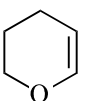


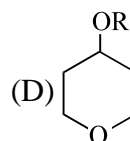
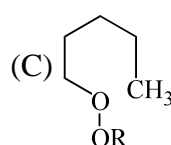
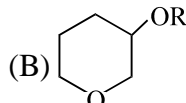
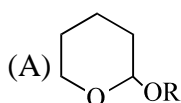
Q.20 (A) $\text{C}_3\text{H}_6\text{O} \xrightarrow[\text{H}_2\text{SO}_4]{\text{NaCN}}$ cyanohydrin of (A). If the cyanohydrin is optically active, then the possible structure of (A) is

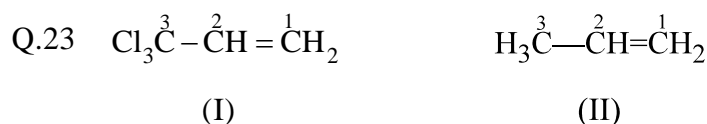


Q.21 Which of the following has minimum reactivity towards nucleophiles?



Q.22  $\xrightarrow{\text{ROH}/\text{H}^+}$ P (major org. product)
 The product P is





In addition of HOBr to (I) and (II)

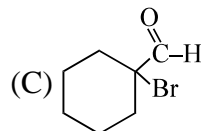
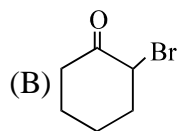
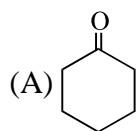
(A) Br is at C_2 in both cases

(B) Br is at C_2 in II and at C_1 in I

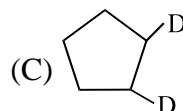
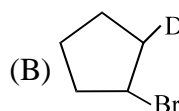
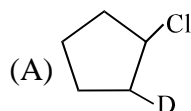
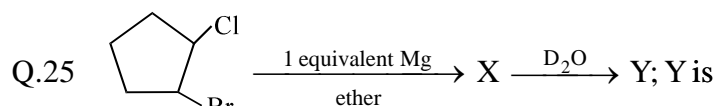
(C) Br is at C_1 in II and C_2 in I

(D) Br is at C_1 in both cases

Q.24 Greatest amount of hydration is in



(D) All are equal



(D) none of these

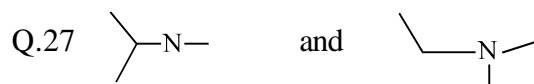
Q.26 How many number of optically active isomers are possible for 2,3-dibromo butane 1,4-dioic acid?

(A) 2

(B) 3

(C) 4

(D) 1



Are which type of isomers

(A) Chain

(B) Position

(C) Metamerism

(D) functional

Q.28 Most stable conformation of ethylene glycol

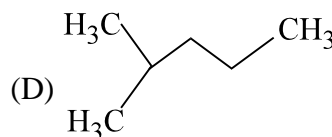
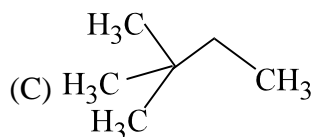
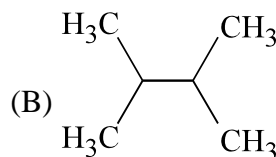
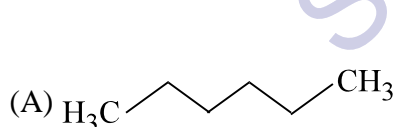
(A) Eclipsed form

(B) Staggered form

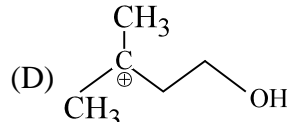
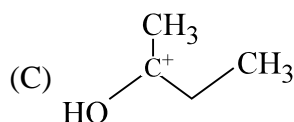
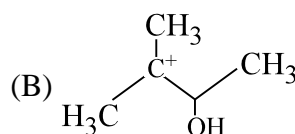
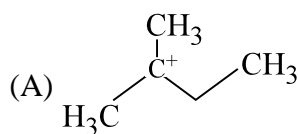
(C) Skew form

(D) None of these

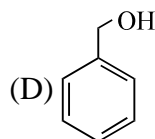
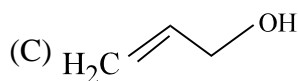
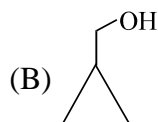
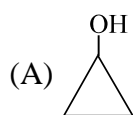
Q.29 Which has maximum B.P.?



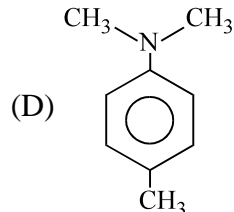
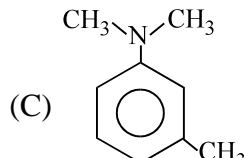
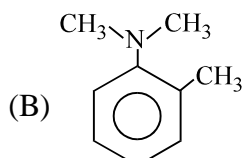
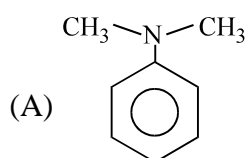
Q.30 Which of the following carbocation is most stable?



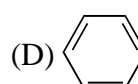
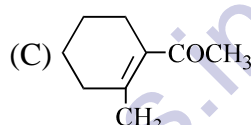
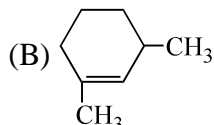
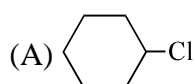
Q.31 Which of the following alcohol shows fastest reaction with HI ?



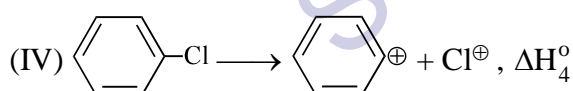
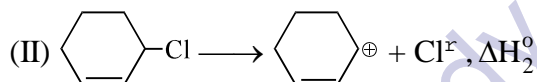
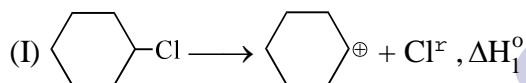
Q.32 Which of the following is strongest base.



Q.33 In which of the following molecule all the effect namely inductive, mesomeric & hyperconjugation operate



Q.34 For the reactions



The correct decreasing order of enthalpies of reaction for producing carbocation is

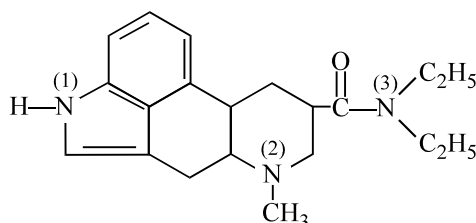
(A) $\Delta H_1^0 > \Delta H_2^0 > \Delta H_3^0 > \Delta H_4^0$

(B) $\Delta H_4^0 > \Delta H_1^0 > \Delta H_2^0 > \Delta H_3^0$

(C) $\Delta H_3^0 > \Delta H_2^0 > \Delta H_1^0 > \Delta H_4^0$

(D) $\Delta H_2^0 > \Delta H_1^0 > \Delta H_4^0 > \Delta H_3^0$

Q.35 Correct order of basicity of various nitrogen in LSD is



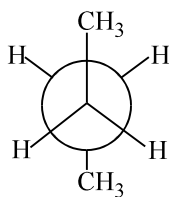
(A) $1 > 2 > 3$

(B) $2 > 1 > 3$

(C) $2 > 3 > 1$

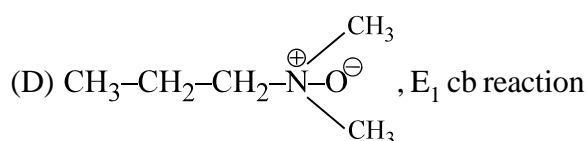
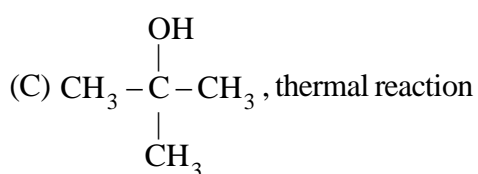
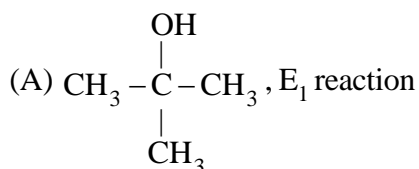
(D) $3 > 2 > 1$

Q.36 2 around
 C_2-C_3 bond by 120° will lead to

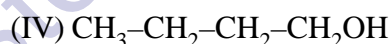
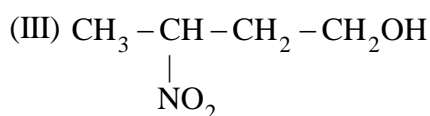
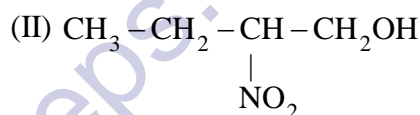
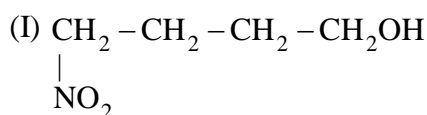


- (A) gauche (B) staggered (C) partially eclipsed (D) fully eclipsed

Q.37 Which of following is correctly matched.



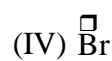
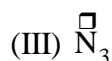
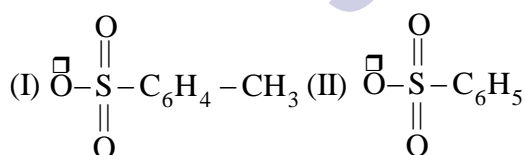
Q.38 Arrange reactivity of given alcohol in increasing order of elimination reaction



Select answer from codes given below:

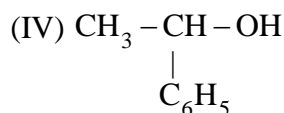
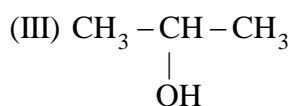
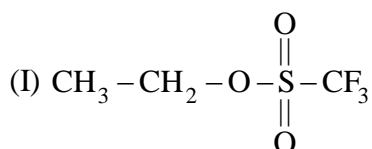
- (A) I, II, IV, III (B) I, II, III, IV (C) II, III, I, IV (D) II, III, IV, I

Q.39 Arrange leaving power of Nu^+ group in decreasing order

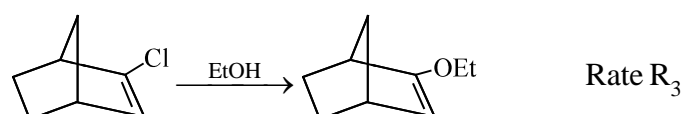
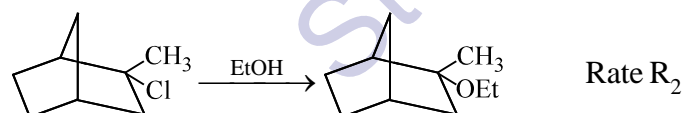
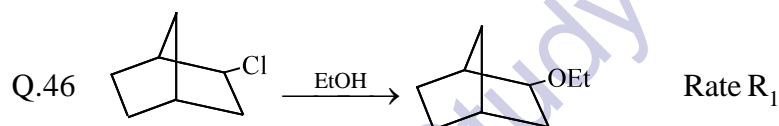
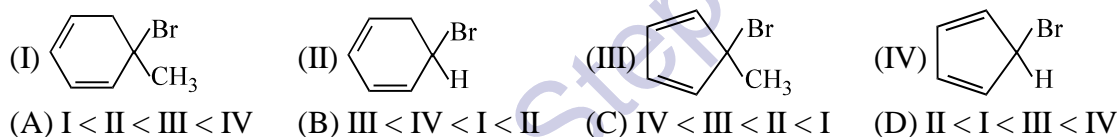
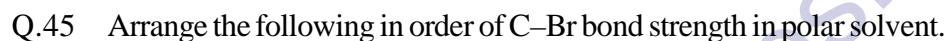
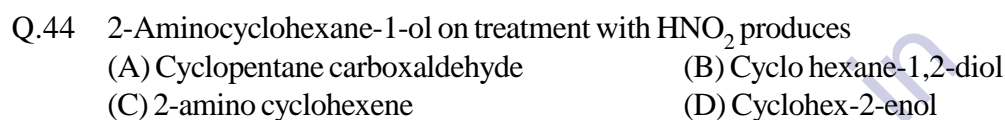
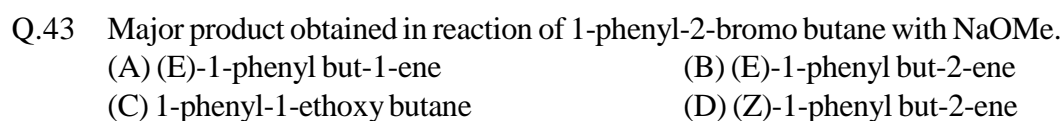
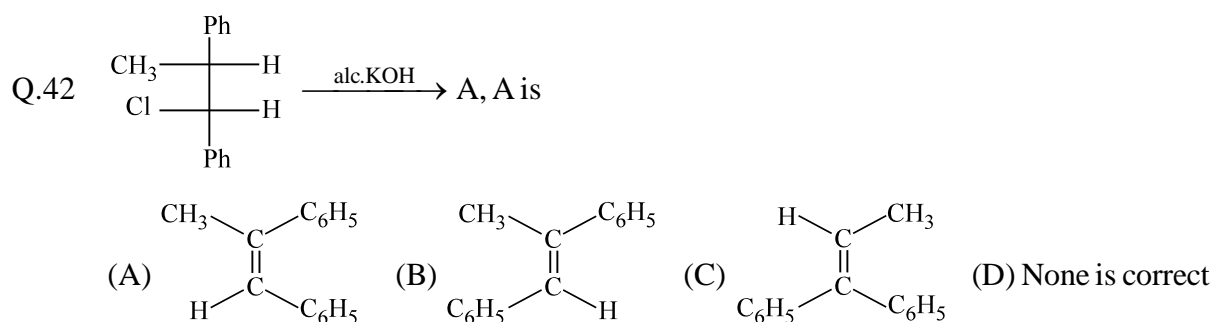
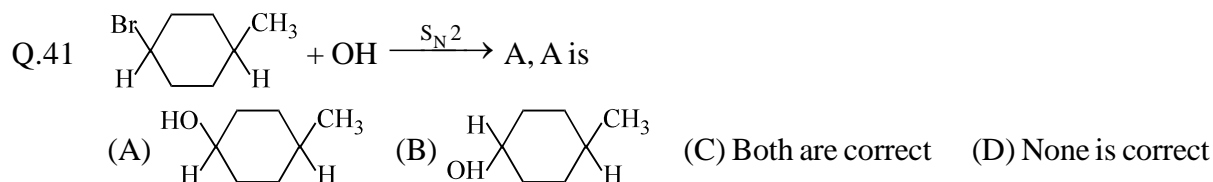


- (A) II, I, III, IV (B) II, I, IV, III (C) I, II, IV, III (D) I, II, III, IV

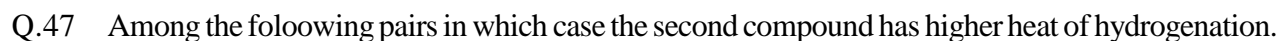
Q.40 Arrange decreasing order of reactivity of these compounds for nucleophilic substitution reaction


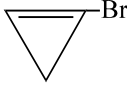


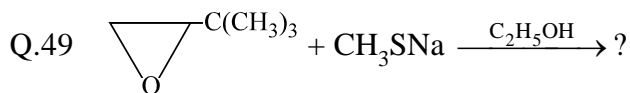
- (A) III, IV, I, II (B) III, IV, II, I (C) I, II, III, IV (D) I, II, IV, III



Which of following is correct :

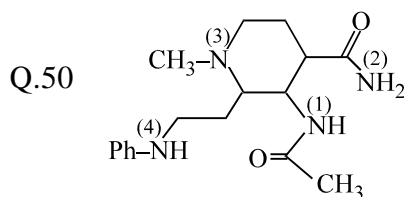


- Q.48 (I) -Br, which is not correct about (I)
- (A) I is more soluble than bromocyclopropane
 (B) I gives pale yellow ppt. on addition with AgNO_3
 (C) I is having lower dipole moment than bromocyclopropane
 (D) I have more ionic character than 



The product formed is

- (A) $\text{CH}_3\text{SCH}_2-\underset{\text{OH}}{\text{CH}}-\text{C}(\text{CH}_3)_3$ (B) $(\text{CH}_3)_3\text{C}-\underset{\text{SCH}_3}{\text{CH}}-\text{CH}_2\text{OH}$
 (C) $\text{CH}_3\text{SCH}_2\underset{\text{OH}}{\text{CH}}-\text{C}(\text{CH}_3)_3$ (D) $(\text{CH}_3)_3\text{C}-\text{CH}_2\underset{\text{OH}}{\text{CH}}-\text{SCH}_3$

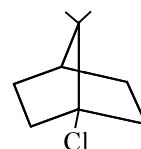


Correct order of basicity is

- (A) $3 > 1 > 2 > 4$ (B) $3 < 1 < 2 < 4$ (C) $3 < 4 < 1 < 2$ (D) $3 > 4 > 1 > 2$

- Q.51 Which of the following statement about the reactivity of 1-chloro apocamphane toward AgNO_3 is true.

- (A) React by $\text{S}_{\text{N}}1$ mechanism (B) React by $\text{S}_{\text{N}}2$ mechanism
 (C) React by $\text{S}_{\text{N}}\text{i}$ mechanism (D) Does not react




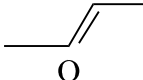
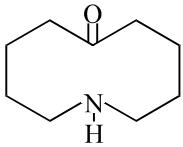
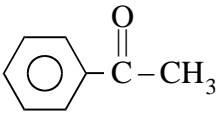
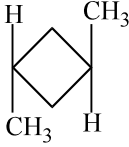
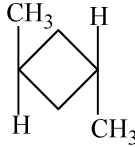
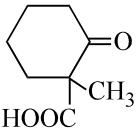
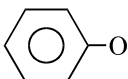
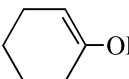
- Q.52 The resonance energy of following heterocycles is in the order
- (A) pyrole > furan > pyridine (B) furan > pyrole > pyridine
 (C) pyridine > pyrole > furan (D) pyridine > furan > pyrole

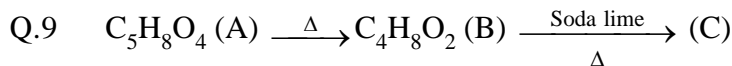
- Q.53 Arrange the following halide in decreasing order of $\text{S}_{\text{N}}1$ reactivity.

- (I) $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ (II) $\text{CH}_2=\underset{\text{Cl}}{\text{CH}}\text{CHCH}_3$ (III) $\text{CH}_3\text{CH}_2\underset{\text{Cl}}{\text{CH}}\text{CH}_3$
 (A) $\text{I} > \text{II} > \text{III}$ (B) $\text{II} > \text{I} > \text{III}$ (C) $\text{II} > \text{III} > \text{I}$ (D) $\text{III} > \text{II} > \text{I}$

EXERCISE-II

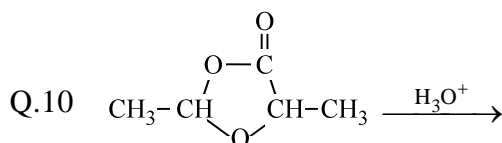
(Choose the correct option. One or more than one are correct)

- Q.1   which is/are incorrect statements?
 (A) P is cis- and Q is trans- (B) P is Z and Q is E
 (C) P is R and Q is S (D) P and Q are having same structural formula
- Q.2 $\text{CH}_3\text{CH}_2\text{NO}_2$ will not show..... isomerism:
 (A) Chain (B) functional (C) tautomerism (D) geometrical
- Q.3 $\begin{array}{c} \text{CHCOOH} \\ || \\ \text{CHCOOH} \end{array}$ (maleic acid) can form:
 (A) stereoisomer (B) geometrical isomer (C) position isomer (D) functional isomer
- Q.4 Which can show tautomerism ?
 (A)  (B) $\text{Ph}-\text{CH}_2-\text{NO}$ (C)  (D) $\text{CH}_3-\text{C}(=\text{O})-\text{NH}_2$
- Q.5  
 I and II are not
 (A) achiral-identical mirror images (B) chiral-enantiomers
 (C) geometrical isomers of each other (D) racemic mixture
- Q.6 In which of following compound chiral center is not affected on heating.
 (A) $\text{CH}_3-\text{CH}(\text{OH})-\text{COOH}$ (B) 
 (C) $\text{CH}_3-\text{CH}(\text{OH})-\text{CH}_2-\text{COOH}$ (D) $\text{CH}_3-\text{CH}(\text{CH}_2\text{COOH})\text{COOH}$
- Q.7 Which are correct statements?
 (A) methyl malonic acid is converted into propanoic acid on heating
 (B) succinic acid forms succinic anhydride on heating
 (C) 3-hydroxy propanoic acid forms Lactide on heating
 (D) $\text{CH}_3-\text{C}(=\text{O})-\text{CH}_2\text{COOH}$ forms acetone on heating
- Q.8 Select incorrect statements:
 (A)  and  both give colour with neutral FeCl_3 solution
 (B) 2-pentanone and 3-pentanone are metamers
 (C) product formed when benzaldehyde reacts with hydroxylamine shows optical isomerism
 (D) 1,2-dibromocyclohexane shows geometrical and optical isomerism.



C is hydrocarbon occupying 0.509 litre per g approximately. Hence A and B are:

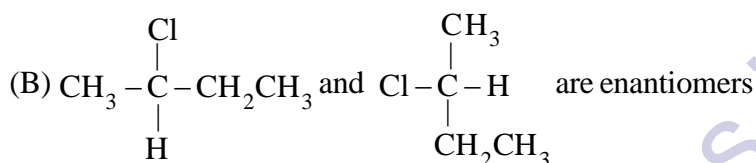
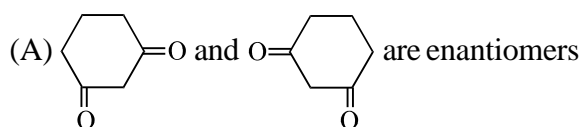
- (A) methyl malonic acid, propanoic acid (B) succinic acid, succinic anhydride
 (C) Dimethylmalonic acid, 2-Methylpropanoic acid (D) Ethyl Malonic acid, Butanoic acid



products can be: (Both stable & unstable form)

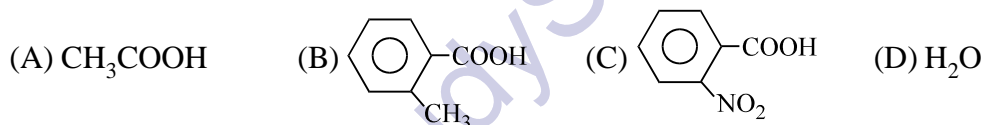
- (A) $CH_3CH(OH)_2$, $CH_3CH(OH)COOH$ (B) CH_3CHO , $CH_3CH(OH)COOH$
 (C) CH_3CH_2COOH , CH_3CH_2OH (D) $CH_3CH(OH)COOH$, CH_3CH_2OH

Q.11 Which are incorrect statements:

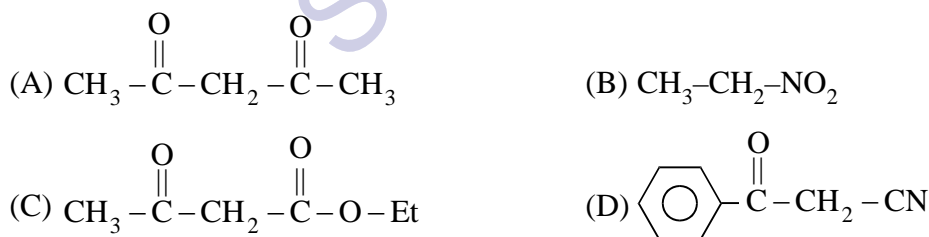


- (C) Argol (sodium potassium tartarate) will show optical isomerism.
 (D) CH_3CHO on reaction with HCN gives racemic mixture.

Q.12 Which is/are less acidic than Benzoic acid?



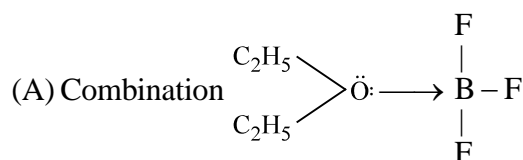
Q.13 Which have active methylene group?



Q.14 Which of the following are not resonating structures of each other:



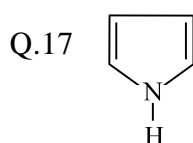
Q.15 The unshared electron on the oxygen atom of an ether (basic centre) account for all the following except:



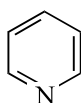
- (B) Formation of oxonium salt with acids such as $\left[\text{C}_2\text{H}_5 - \underset{\substack{\downarrow \\ \text{H}}}{\text{O}} - \text{C}_2\text{H}_5 \right]^+ \text{Cl}^-$
- (C) Formation of peroxides (explosive)
- (D) Chemical inactivity of ether

Q.16 Which of the following compounds yield most stable carbanion after rupture of ($\text{C}_1\text{--C}_2$) bond:

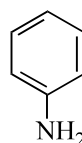
- (A) $\text{CH}_3 - \underset{\substack{1 \quad 2}}{\overset{\text{O}}{\parallel}} \text{C} - \text{CCl}_3$ (B) $\text{CH}_3 - \underset{\substack{1 \quad 2}}{\overset{\text{O}}{\parallel}} \text{C} - \text{CBr}_3$ (C) $\text{CH}_3 - \text{CH}_2 - \underset{\substack{1 \quad 2}}{\overset{\text{O}}{\parallel}} \text{C} - \text{Cl}_3$ (D) none of these



pyrrole (I)



pyridine (II)



aniline (III)

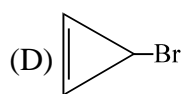
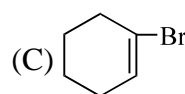
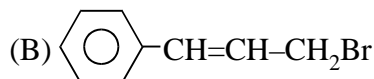
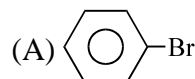
which is/are correct statements ?

- (A) I is more basic than II (B) II is more basic than I and III
- (C) III is more basic than II (D) all are aromatic bases

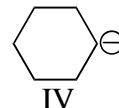
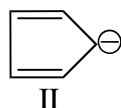
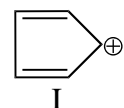
Q.18 Which is/are untrue statement(s)?

- (A) Protonation increases electrophilic nature of carbonyl group
- (B) CF_3SO_3^- is better leaving group than CH_3SO_3^-
- (C) Benzyl carbonium ion is stabilised by resonance
- (D) $\text{CCl}_3\text{CH} \begin{matrix} \diagup \text{OH} \\ \diagdown \text{OH} \end{matrix}$ is unstable.

Q.19 Which reacts with AgNO_3 to give ppt.?

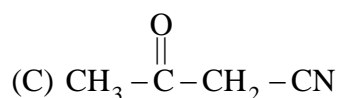
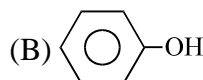


Q.20 Identify the correct statment(s).

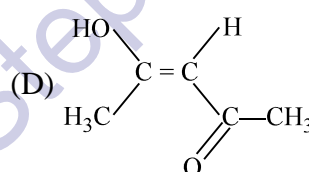
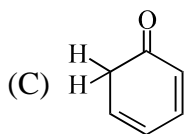
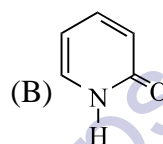
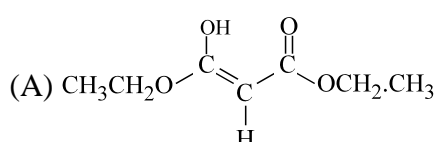


- (A) I & III are antiaromatic (B) III & IV are non-aromatic
- (C) II alone is aromatic (D) II & IV are non-aromatic

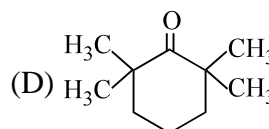
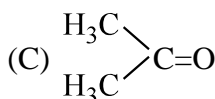
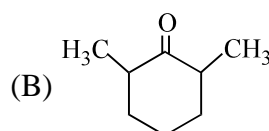
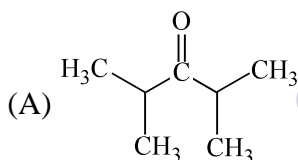
Q.21 Which have acidic hydrogen?



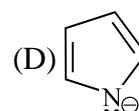
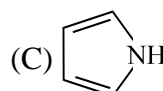
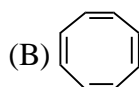
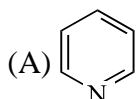
- Q.22 C-C and C=C bond lengths are unequal in:
 (A) benzene (B) 1,3 buta-di-ene
 (C) 1,3 cyclohexa-di-ene (D) None
- Q.23 Products formed when HCl adds to 2,4- hexadiene is:
 (A) 4-chloro-2-hexene (B) 2-chloro-3-hexene
 (C) 2-chloro-4-hexene (D) 1-chloro-2-hexene
- Q.24 Which of the following may be classed as an electrophilic reagent?
 (A) BCl_3 (B) NH_4^+ (C) CH_3^+ (D) AlCl_4^-
- Q.25 The acid strength of substituted carboxylic acids is known to be dependent on the nature and position of the substituent. In the following examples, an attempt has been made to arrange the acids in order of acid strength, the strongest first. One of the series is incorrect—which one?
 (A) $\text{CH}_3\cdot\text{CH}_2\text{CH}(\text{Cl})\cdot\text{COOH} > \text{CH}_3\cdot\text{CH}(\text{Cl})\cdot\text{CH}_2\text{COOH} > \text{CH}_3\cdot\text{CH}_2\cdot\text{CH}_2\cdot\text{COOH}$
 (B) $\text{NO}_2\cdot\text{CH}_2\cdot\text{COOH} > \text{HOCH}_2\cdot\text{COOH} > \text{CH}_3\cdot\text{COOH}$
 (C) $\text{Cl}_3\text{C}\cdot\text{COOH} > \text{BrCH}_2\cdot\text{COOH} > \text{FCH}_2\cdot\text{COOH}$
 (D) $\text{CH}_3\cdot\text{COOH} > \text{CH}_3\cdot\text{CH}_2\cdot\text{COOH} > (\text{CH}_3)_3\text{C}\cdot\text{COOH}$
- Q.26 Which of the following would not have a dipole moment?
 (A) CCl_4 (B) CH_2Cl_2 (C) trans-1,2-dichloroethene (D) $\text{ClC}\equiv\text{CCl}$
- Q.27 Which of the following structures represent the less stable tautomeric form?



- Q.28 Which of the following compounds cannot exhibit keto-enol tautomerism?



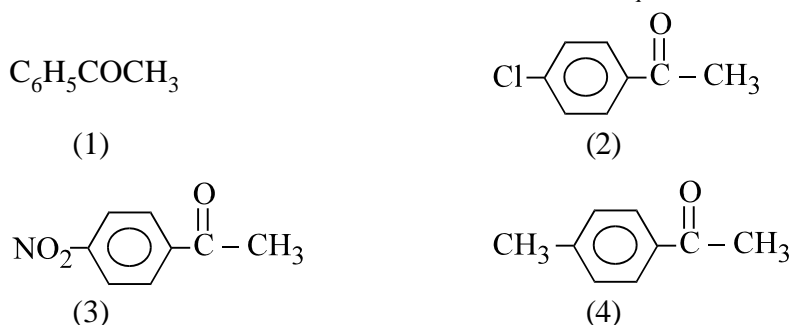
- Q.29 In tautomerism
 (A) a proton is moved around the molecule (B) electrons are moved around the molecule
 (C) no actual movement occurs (D) shift of double bond occurs
- Q.30 Which species is not aromatic?



- Q.31 Aromatic character is possible only when
 (A) six electrons are delocalized
 (B) the molecule is cyclic and planar having delocalized $(4n + 2)\pi$ electrons where $n = 1, 2, 3, \dots$
 (C) alternate sigma (σ) & pie (π) bond are present.
 (D) None is true

EXERCISE-III

Q.1 Arrange the following compounds in decreasing order of K_{eq} for hydrate formation.



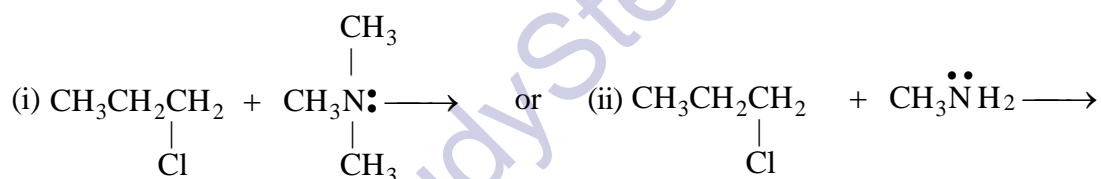
Q.2 Arrange the following compounds in order of :
Decreasing S_N1 reaction rate :



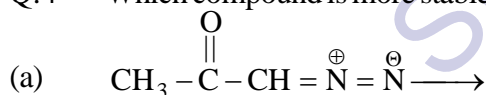
Q.3(a) Decreasing S_N2 reaction rate :



(b) Explain which of these reactions would have the faster rate?

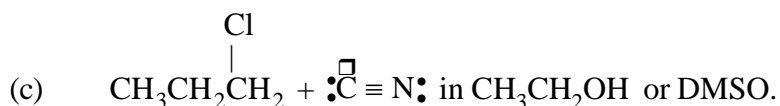
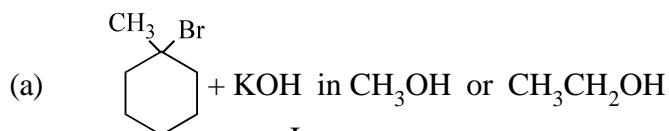


Q.4 Which compound is more stable explain

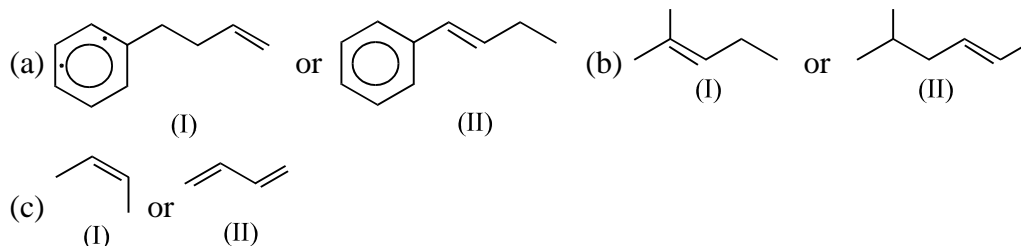


Q.5 Arrange the isomers of molecular formula $\text{C}_4\text{H}_9\text{Cl}$ in order of decreasing rate of reaction with sodium iodide in acetone.

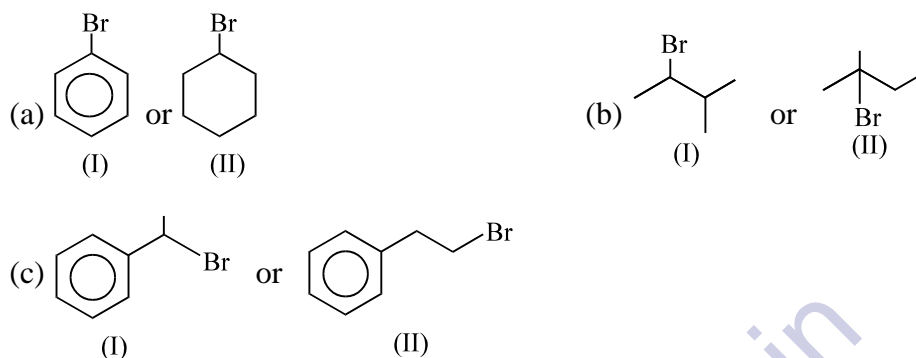
Q.6 Explain in which solvents these reactions are faster :



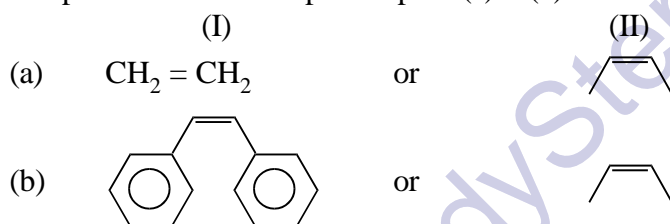
Q.7(i) Choose the member of the following pairs of unsaturated hydrocarbons that is more reactive towards acid-catalysed hydration and predict the regiochemistry of the alcohols formed from this compound.



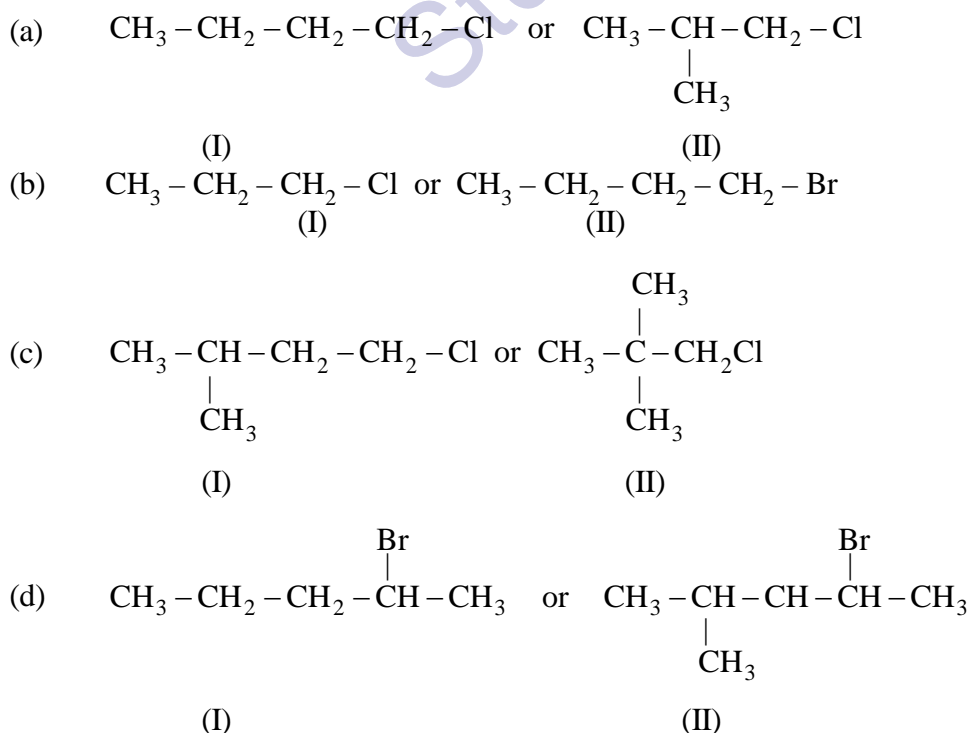
(ii) Predict on the basis of carbocation stability, which member of each of the following pairs hydrolyses at the faster rate.



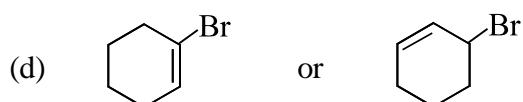
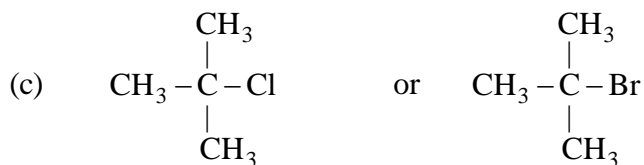
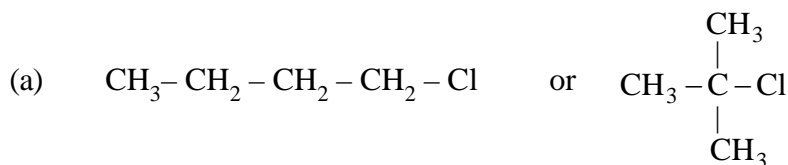
Q.8 Assuming that cation stability governs the barrier for protonation in H – X additions, predict which compound in each of the pairs in parts (a) to (b) will be more rapidly hydrochlorinated in a polar solvent.



Q.9 Select the member of each pair that shows faster rate of S_N2 reaction with KI in acetone.



Q.10 Select the member of each pair that undergoes S_N1 solvolysis in aqueous ethanol more rapidly.

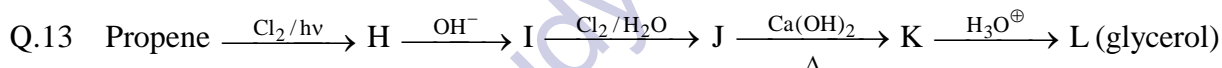


Q.11 In each of the following indicate which reaction will occur faster. Explain your reasoning.

- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$ or $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{I}$ with sodium cyanide in dimethyl sulfoxide.
- 1-chloro-2-methylbutane or 1-chloropentane with sodium iodide in acetone.
- Hexyl chloride or cyclohexyl chloride with sodium azide in DMF.
- Solvolysis of 1-bromo-2,2-dimethylpropane or tert-butyl bromide in ethanol.
- Reaction of 1-chlorobutane with sodium acetate in acetic acid or with sodium methoxide in methanol.
- Reaction of 1-chlorobutane with sodium azide or sodium p-toluenesulfonate in aqueous ethanol.

Q.12 Classify each of the following species as electrophile or nucleophile & explain your choice.

- | | | | | | |
|--------------------------------|-----------------------------|--------------------------------|-------------------------------------|-------------------------------|---------------------|
| (a) CH_3CO_2^- | (b) CH_3O^- | (c) BF_3 | (d) C^+Cl | (e) C^-Me_3 | (f) $:\text{CCl}_2$ |
| (g) SiF_4 | (h) Br^- | (i) $:\text{P}(\text{CH}_3)_3$ | (j) $\text{Me}_2\text{C}^+\text{H}$ | (k) $\text{CH}_2=\text{CH}_2$ | (l) HCl |



Q.14 Of the following statements, which are true for S_N2 reaction.

- Tertiary alkyl halides react faster than secondary.
- The absolute configuration of product is opposite to that of the reactant when an optically active substrate is used.
- The reaction shows first order kinetics.
- The rate of the reaction depends markedly on the nucleophilicity of the attacking reagent.
- The mechanism is one step.
- Carbocations are intermediate.
- $\text{Rate} \propto [\text{Alkyl halides}]$
- The rate of the reaction depends on the nature of the leaving group.

Q.15 Of the following statements which are true for S_N1 reaction.

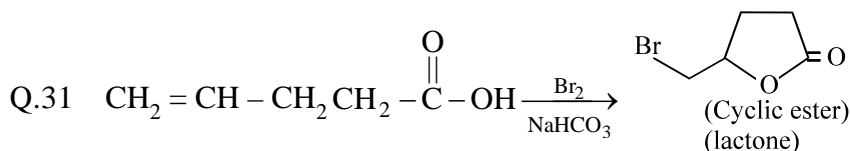
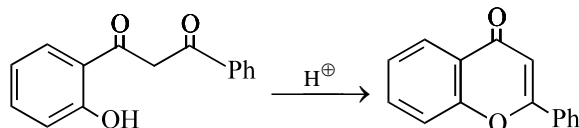
- Tertiary alkyl halides react faster than secondary.
- The absolute configuration of the product is opposite to that of the reactant when an optical active substrate is used.
- The reaction shows first order kinetics.
- The rate of reaction depends markedly on the nucleophilicity of the nucleophile.
- The mechanism is two step.
- Carbocations are intermediate.
- $\text{Rate} \propto [\text{Alkyl halides}]$
- The rate of the reaction depends on the nature of the leaving group.

- Q.16 Explain why $\text{Cl}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3$ is hydrolysed more rapidly than $\text{CH}_3-\text{O}-\text{CH}_2-\text{CH}_2-\text{Cl}$
- Q.17 If the temperature is not kept below 25°C during the reaction of primary alcohols with p-toluenesulfonyl chloride in pyridine, it is sometimes observed that the isolated product is not the desired alkyl p-toluenesulfonate but is instead the corresponding alkyl chloride. Suggest a mechanistic explanation for this observation.
- Q.18 Because the $\text{S}_{\text{N}}1$ reaction goes through a flat carbocation, we might expect an optically active starting material to give a completely racemized product. In most cases, however, $\text{S}_{\text{N}}1$ reactions actually give more of the inversion product. In general, as the stability of the carbocation increases, the excess inversion product decreases. Extremely stable carbocations give completely racemic products. Explain these observations.
- Q.19 cis-1-Bromo-2-tert-butylcyclohexane and trans-1-bromo-2-tert-butylcyclohexane both react with sodium ethoxide in ethanol to give 1-tert-butylcyclohexene. The cis isomer reacts much more rapidly than the trans isomer. Explain.
- Q.20 The reaction of an amine with an alkyl halide gives an ammonium salt.
- $$\text{R}_3\text{N}:\text{ + R}'\text{-X} \longrightarrow \text{R}_3\overset{+}{\text{N}}\text{-R}'\text{X}^-$$
- amine alkyl halide ammonium salt
- The rate of this $\text{S}_{\text{N}}2$ reaction is sensitive to the polarity of the solvent. Draw an energy diagram for this reaction in a nonpolar solvent and another in a polar solvent. Consider the nature of the transition state, and explain why this reaction should be sensitive to the polarity of the solvent. Predict whether it will be faster or slower in a more polar solvent.
- Q.21 There is an overall 29-fold difference in reactivity of 1-chlorohexane, 2-chlorohexane towards potassium iodide in acetone.
- (a) Which one is the most reactive? Why?
- (b) Two of the isomers differ by only a factor of 2 in reactivity. Which two are these? Which one is the more reactive? Why?
- Q.22 The compound KSCN is a source of thiocyanate ion.
- Write the two most stable Lewis structures for thiocyanate ion and identify the atom in each that bears a formal charge of -1 .
- Q.23 With the help of following data show HBr exhibits the peroxide effect.
- | | ΔH_1^0 | ΔH_2^0 |
|---|----------------|---|
| $\text{H-X} \quad \dot{\text{X}} + \text{CH}_2=\text{CH}_2 \rightarrow \text{XCH}_2-\dot{\text{C}}\text{H}_2$
<div style="margin-left: 100px;">↓</div> | | $\text{XCH}_2-\dot{\text{C}}\text{H}_2 + \text{H-X} \rightarrow \text{XCH}_2\text{CH}_3 + \dot{\text{X}}$ |
| HCl | -67 | + 12.6 |
| HBr | -25.1 | - 50.2 |
| HI | +46 | -117.1 |
- All are in kJ mole^{-1} .
- Q.24 CHCl_2F is found to react more slowly than CHCl_3 in alkaline hydrolysis with plausible mechanism. Illustrate this phenomenon.
- Q.25 Formulate the reactions between but-1-ene in presence of small amount of benzoyl peroxide & (i) CCl_4 (ii) CBrCl_3
Give your reasons.
- Q.26 p-Amino benzaldehyde behaves like an amide as is evident by the fact that it is not readily attacked by the nucleophile at the carbonyl carbon. Explain.
- Q.27 When CH_3MgBr reacts with 5-chloro-2-pentanone, cyclic ether is formed instead of alcohol. Explain.
- Q.28 The dichlorocarbene reacts with electron rich species like phenol whereas it doesn't react with benzene explain.

Q.29 Explain the following :

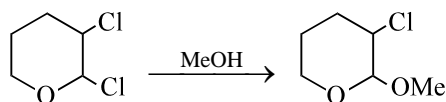
- (a) 3-pentanol reacts with HBr to give a mixture of 3 & 2- bromopentane. The exact composition of the mixture depends upon whether gaseous or aqueous HBr is used.
- (b) Hydration of 3-phenyl-1-butene in dil H_2SO_4 is not a satisfactory method for preparing 3-phenyl-2- butanol

Q.30 Why is elimination preferred to hemiacetal formation in the acid catalysed cyclisation of this ketone ?

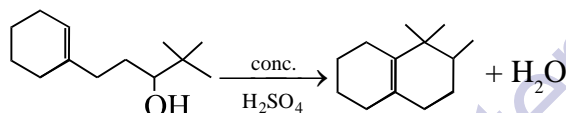


This type of reaction is called “bromolactonisation”. Suggest a mechanism.

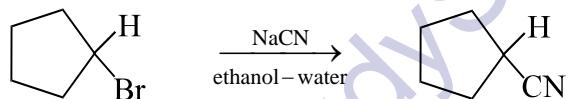
Q.32 Draw mechanisms for these reactions, explaining why these particular products are formed.



Q.33 Write a reasonable and detailed mechanism for the following transformation.



Q.34 The reaction of cyclopentyl bromide with sodium cyanide to give cyclopentyl cyanide

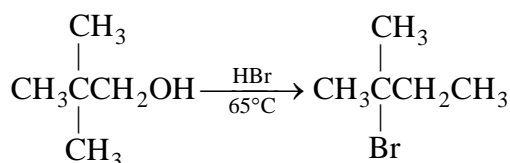


Cyclopentyl bromide

Cyclopentyl cyanide

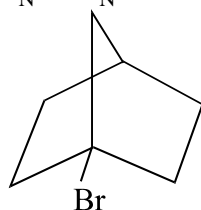
proceeds faster if a small amount of sodium iodide is added to the reaction mixture. Can you suggest a reasonable mechanism to explain the catalytic function of sodium iodide?

Q.35 The reaction of 2,2-dimethyl-1-propanol with HBr is very slow and gives 2-bromo-2-methyl-propane as the major product.



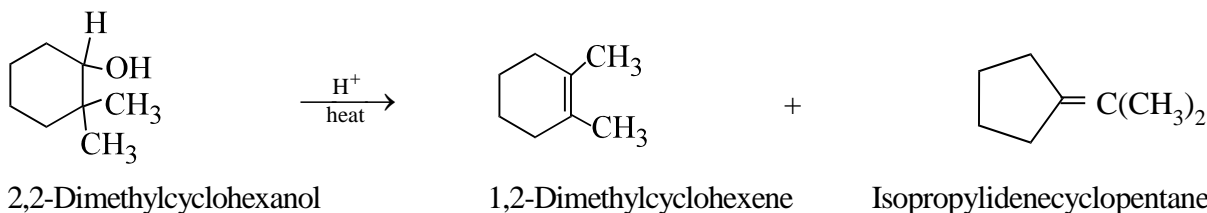
Give a mechanistic explanation for these observations.

Q.36 1-Bromobicyclo [2.2.1] heptane (the structure of which is shown) is exceedingly unreactive towards nucleophilic substitution by either the $\text{S}_\text{N}1$ or $\text{S}_\text{N}2$ mechanism.



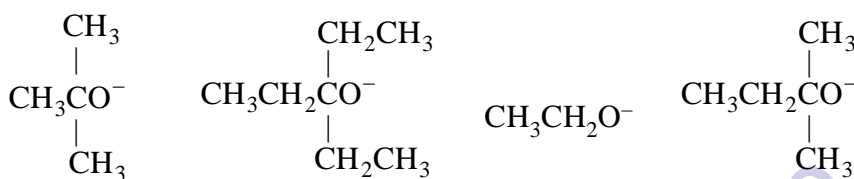
1-Bromobicyclo [2.2.1] heptane

- Q.37 We saw that acid-catalyzed dehydration of 2,2-dimethyl-cyclohexanol afforded 1,2-dimethylcyclohexene. To explain this product we must write a mechanism for the reaction in which a methyl shift transforms a secondary carbocation to a tertiary one. Another product of the dehydration of 2,2-dimethylcyclohexanol is isopropylidenecyclopentane. Write a mechanism to rationalize its formation.



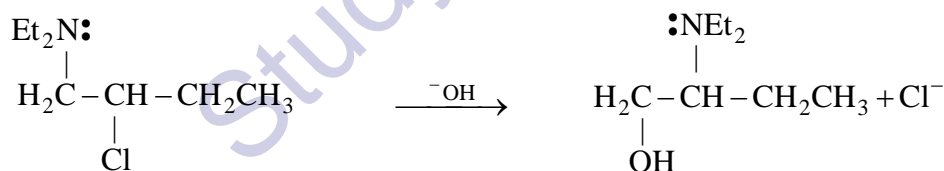
- Q.38 When 2-bromo-2,3-dimethylbutane reacts with a base under E2 conditions, two alkenes (2,3-dimethyl-1-butene and 2,3-dimethyl-2-butene) are formed.

- (a) Which of the following bases would give the highest percentage of the 1-alkene ?
 (b) Which would give the highest percentage of the 2-alkene “

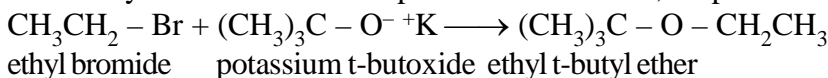


- Q.39 Dr. Don T. Doit wanted to synthesize the anesthetic 2-ethoxy-2-methylpropane. He used ethoxide ion and 2-chloro-2-methylpropane for his synthesis and ended up with very little ether. What was the predominant product of his synthesis ? What reagent should he have used ?

- Q.40 The following reaction takes place under second-order conditions (strong nucleophile), yet the structure of the product shows rearrangement. Also, the rate of this reaction is several thousand times faster than the rate of substitution of hydroxide ion on 2-chlorobutane under similar conditions. Propose a mechanism to explain the enhanced rate and rearrangement observed in this unusual reaction. (“Et” is the abbreviation for ethyl.)

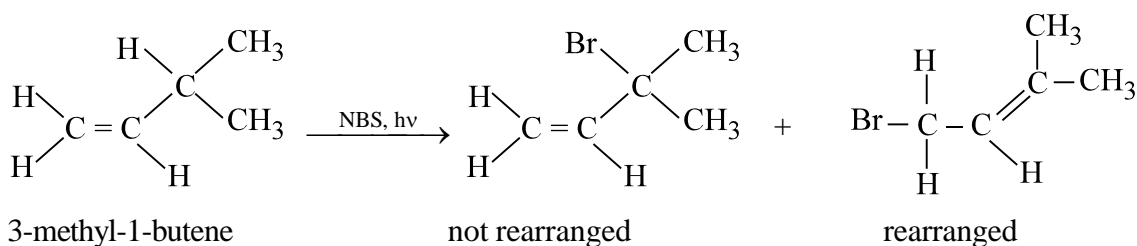


- Q.41 When ethyl bromide is added to potassium t-butoxide, the product is ethyl t-butyl ether.

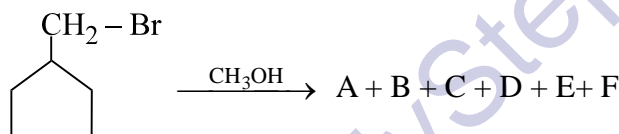


- (a) What happens to the reaction rate if the concentration of ethyl bromide is doubled ?
 (b) What happens to the rate if the concentration of potassium t-butoxide is tripled and the concentration of ethyl bromide is doubled ?
 (c) What happens to the rate if the temperature is raised ?

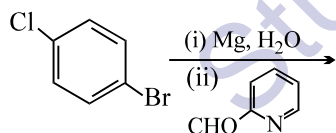
- Q.42 Give a mechanism to explain the two products formed in the following reaction.



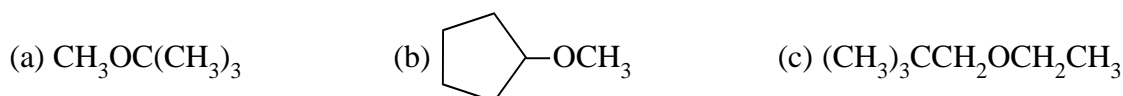
- Q.43 Give the structures of all possible products when 2-chloro-2-methylbutane reacts by the E1 mechanism.
- Q.44 Solvolysis of 1,2-dimethylpropyl p-toluenesulfonate in acetic acid (75°C) yields five different products : three are alkenes and two are substitution products. Suggest reasonable structures for these five products.
- Q.45 Solution A was prepared by dissolving potassium acetate in methanol Solution B was prepared by adding potassium methoxide to acetic acid. Reaction of methyl iodide either with solution A or with solution B gave the same major product. Why ? What was this product?
- Q.46 Solvolysis of 2-bromo-2-methylbutane in acetic acid containing potassium acetate gave three products. Identify them.
- Q.47
- Write the structures or build molecular models of all the isomeric alkyl bromides having the molecular formula $C_5H_{11}Br$.
 - Which one undergoes E1 elimination at the fastest rate ?
 - Which one is incapable of reacting by the E2 mechanism ?
 - Which one can yield only a single alkene on E2 elimination ?
 - For which isomers does E2 elimination give two alkenes that are not constitutional isomers ?
 - Which one yields the most complex mixture of alkenes on E2 elimination ?
- Q.48 Evidence has been reported in the chemical literature that the reaction
- $$(CH_3CH_2)_2CHCH_2Br + KNH_2 \longrightarrow (CH_3CH_2)_2C=CH_2 + NH_3 + KBr$$
- proceeds by the E2 mechanism. Use curved arrow notation to represent the flow of electrons for this process.
- Q.49 The given compound give mixture of six products on treatment with CH_3OH . Write structures of all five products and give mechanism of the reaction.



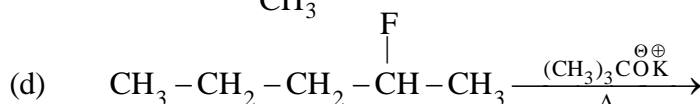
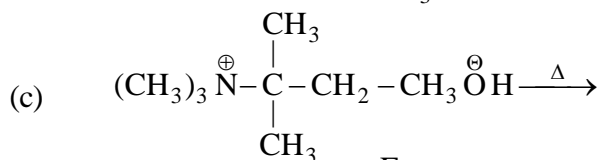
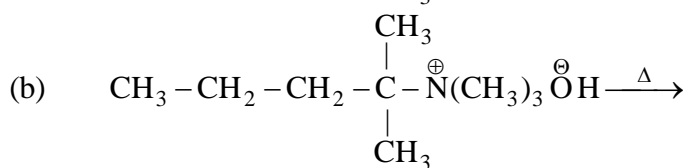
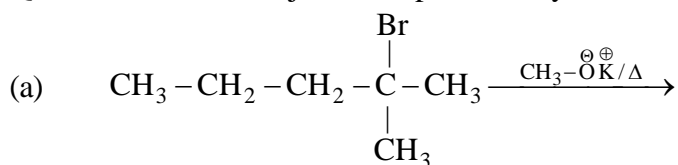
- Q.50 Comment on the selectivity, (that is, say what else might have happened & why it didn't) shown in this grignard addition reaction used in the manufacture of an antihistamine drug, A.



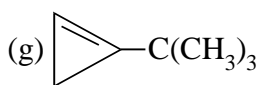
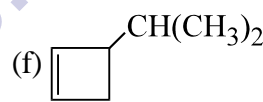
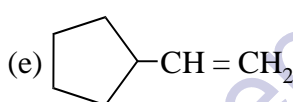
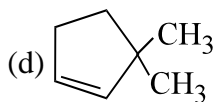
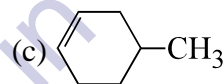
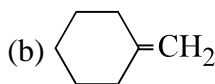
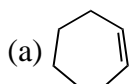
- Q.51 Outline an efficient synthesis of each of the following compounds from the indicated starting material and any necessary organic or inorganic reagents :
- Cyclopentyl cyanide from cyclopentane.
 - Cyclopentyl cyanide from cyclopentene.
 - Cyclopentyl cyanide from cyclopentanol.
 - Isobutyl iodide from isobutyl chloride.
 - Isobutyl iodide from tert-butyl chloride.
 - Isobutyl azide from isopropyl alcohol
- Q.52 Select the combination of alkyl bromide and potassium alkoxide that would be the most effective in the synthesis of the following ethers :



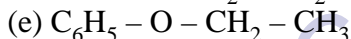
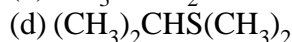
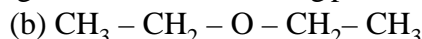
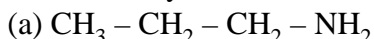
Q.53 Indicate the major alkene produced by each of the following



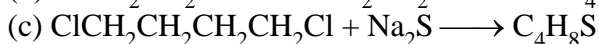
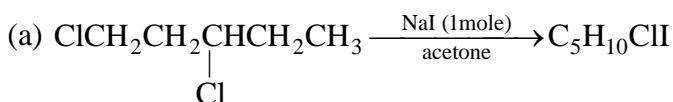
Q.54 Choose the compound of molecular formula $\text{C}_7\text{H}_{13}\text{Br}$ that gives each alkene shown as the exclusive product of E2 elimination.



Q.55 Select the alkyl halide and a nucleophile that will give each of the following products.

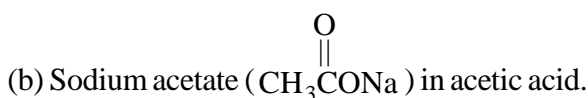


Q.56 Identify the product in each of the following reactions :



Q.57 Write the structure of the principal organic product to be expected from the reaction of 1-bromopropane with each of the following :

(a) Sodium iodide in acetone.



(c) Sodium ethoxide in ethanol.

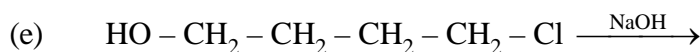
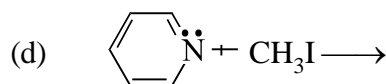
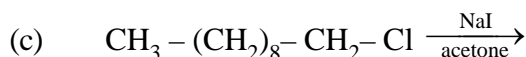
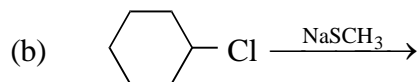
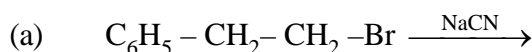
(d) Sodium cyanide in dimethyl sulfoxide.

(e) Sodium azide in aqueous ethanol

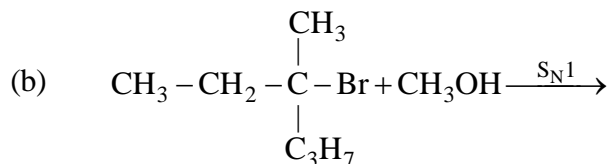
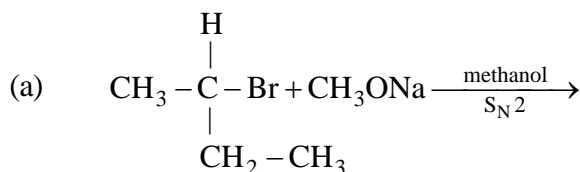
(f) Sodium hydrogen sulfide in ethanol

(g) Sodium methanethiolate (NaSCH_3) in ethanol.

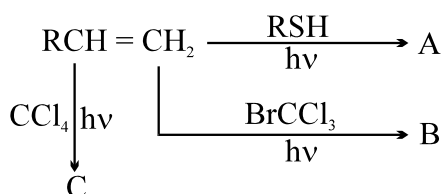
Q.58 Predict the products of the following S_N2 reaction :



Q.59 Draw each of the following reaction in a way that clearly show the stereoisomerism of the products.

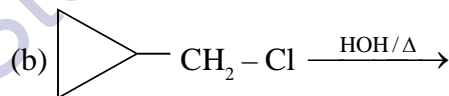
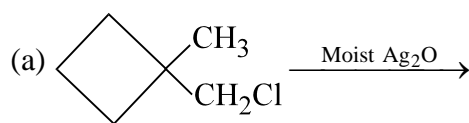


Q.60 What will be the products (A, B, C) in the following reaction?

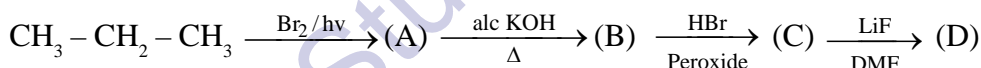


Give a mechanism for each of the reactions.

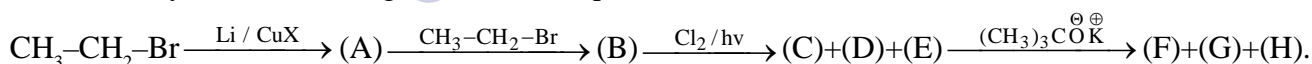
Q.61 Complete the following reactions. Give all possible products in each case. Give mechanism of the reactions.



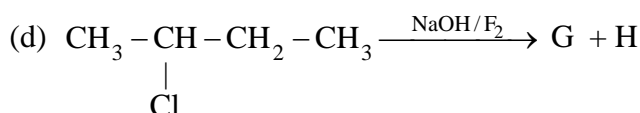
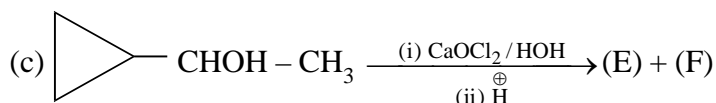
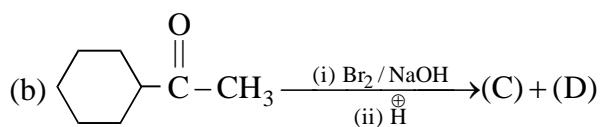
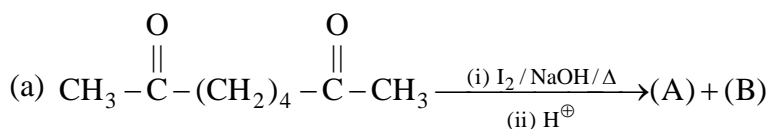
Q.62 Identify (A) to (D) in the given reaction sequence.



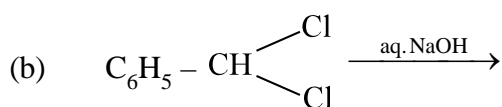
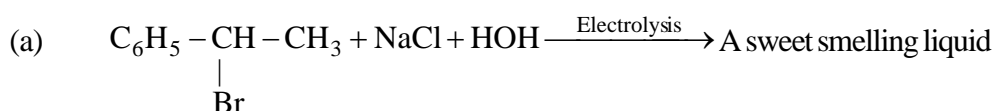
Q.63 Identify (A) to (E) in the given reaction sequence



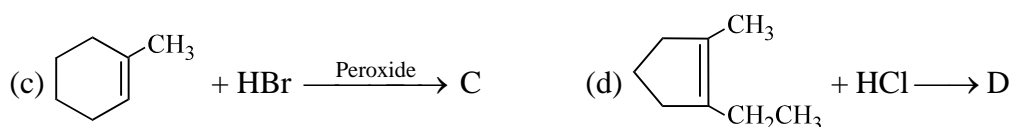
Q.64 Complete the following reactions :



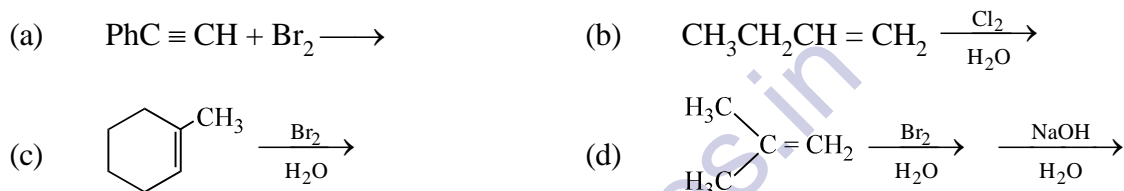
Q.65 Complete the following reactions



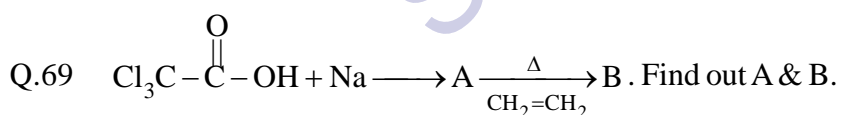
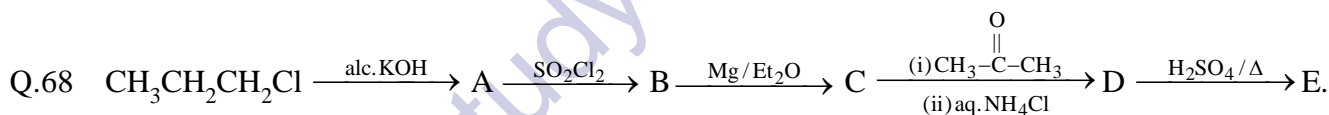
Q.66(i) What are the products of the following reactions ?



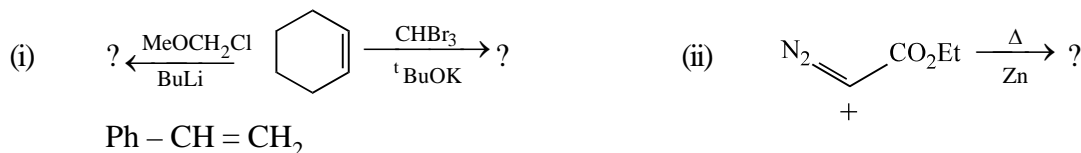
(ii) What are the products of the following reactions ?



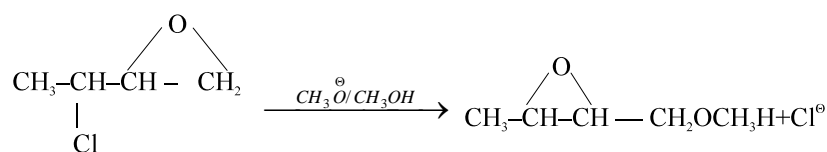
Q.67 What products would be formed in these reactions ?



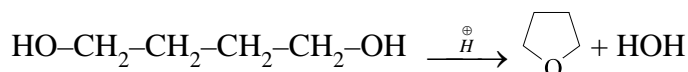
Q.70 Give product and suggest mechanism for these reactions.



Q.71 Propose a mechanism for the following reaction

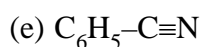
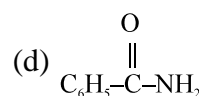
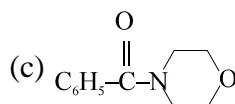
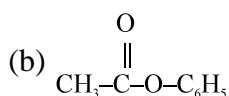
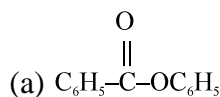


Q.72 Propose a mechanism for the following reaction

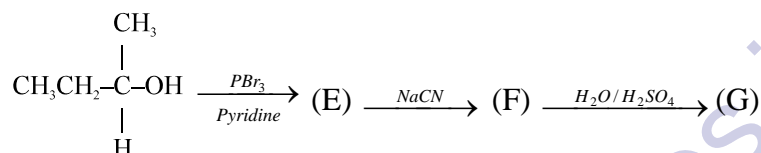


Q.73 Compound (A) $\text{C}_6\text{H}_{14}\text{O}$ is insoluble in water and gives negative Lucas test. On treatment with concentrated H_2SO_4 followed by hydrolysis it gives only one compound (B), $\text{C}_3\text{H}_8\text{O}$. Compound (B) is insoluble in water and gives red colour with ceric ammonium nitrate. (B) gives yellow precipitate (C) and compound (D) on treatment with $\text{I}_2/\text{Na}_2\text{CO}_3/\Delta$ followed by acidification. What are structures of (A), (B), (C) and (D) and give synthesis of (A)?

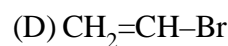
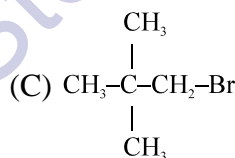
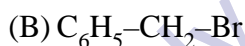
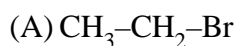
Q.74 Give the product of reaction of each of the following with excess phenylmagnesium bromide followed by acid hydrolysis:



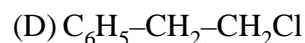
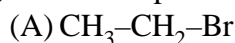
Q.75 Complete the reaction given below:



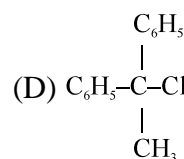
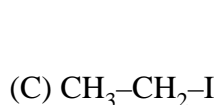
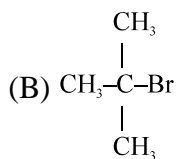
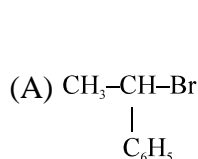
Q.76 Which among the following is most reactive for aliphatic nucleophilic substitution reaction?



Q.77(a) Which compound will give Walden Inversion in $\text{S}_\text{N}2$ reaction?



(b) Which among the following will give $\text{S}_\text{N}1$ reaction?



Q.78 Consider the following statements:

- (1) CH_3 group is o, p-directing group due to hyperconjugation
- (2) CCl_3 is meta directing group due to reverse hyperconjugation
- (3) CCl_3 group is meta directing group due to mesomeric effect.
- (4) $-\text{CH}=\text{CH}_2$ is group is o, p-directing group.

of these statements:

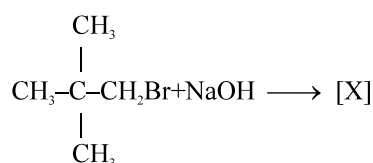
(A) 1 and 2 are correct

(B) 1 and 3 are correct

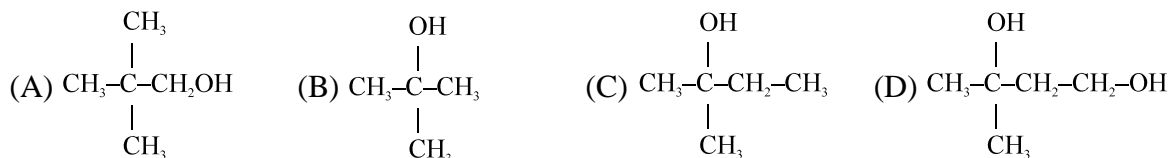
(C) 1, 2 and 4 are correct

(D) 3 and 4 correct

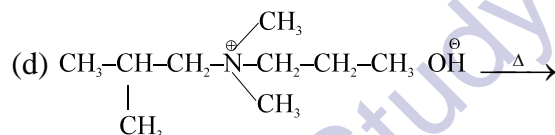
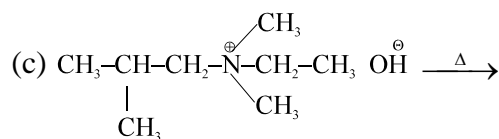
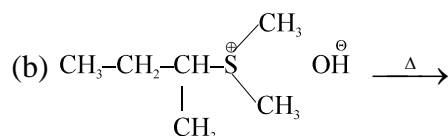
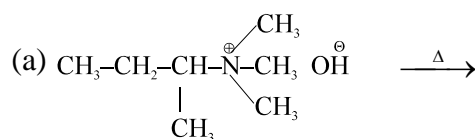
Q.79 Consider the following reaction



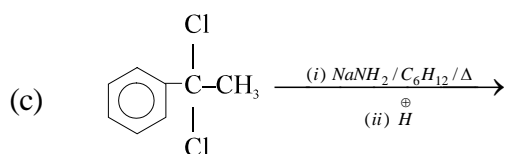
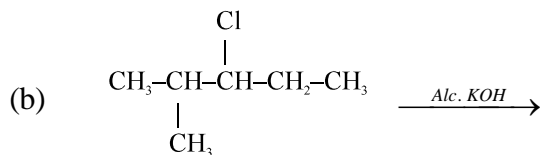
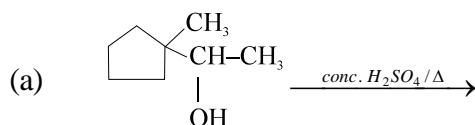
[X] as major product will be



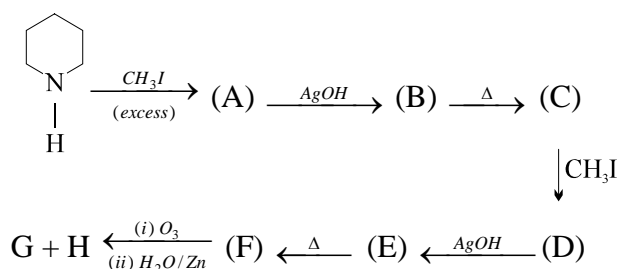
Q.80 Indicate the products which are expected from the following elimination reactions. If several alkanes will be formed then indicate which will be the major product.



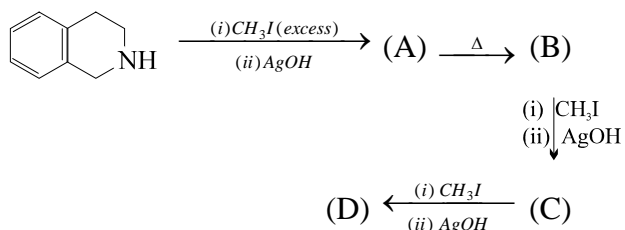
Q.81 Give major product in each of the following reactions:



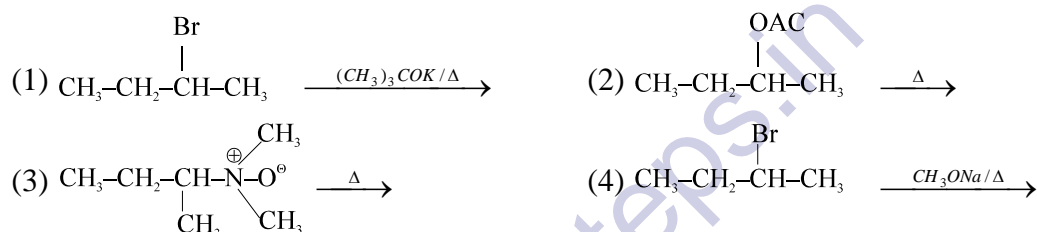
Q.82 Identify A to H in the given reaction sequence:



Q.83 Assign A to (D) in the given reaction sequence:



Q.84 In which reaction formation takes place by Hoffmann rule?



Select the correct answer from the codes given below:

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

Q.85 Consider the following statements:

- (1) Pyrolytic elimination is always syn elimination
- (2) In pyrolytic elimination product formation takes place by most stable eclipsed.
- (3) In pyrolytic elimination product formation takes place by Hoffmann rule.
- (4) In pyrolytic elimination product formation takes place by Saytzeff rule.

Of these statements

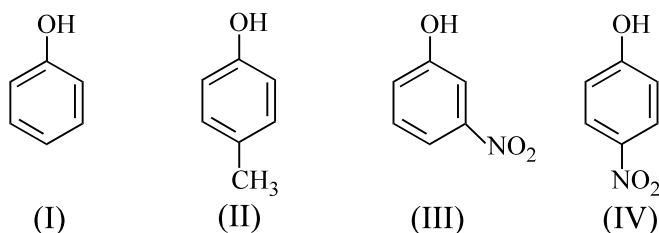
- (A) 1, 2 and 4 are correct (B) 1, 2 and 3 are correct
 (C) 1 and 2 are correct (D) 2 and 3 are correct

EXERCISE-IV (A)


- Q.1 Reaction of $R-CO-NH_2$ with a mixture of Br_2 and KOH gives $R-NH_2$ as the main product. The intermediates involved in this reaction are: [JEE 1992]
- (A) $R-CO-NHBr$ (B) $RNHBBr$
 (C) $R-N=C=O$ (D) $R.CO.NBr_2$

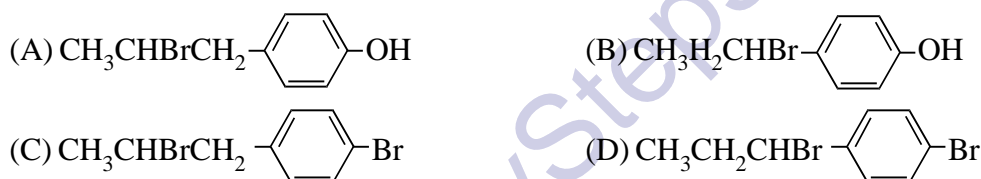
- Q.2 Which one of the following has the smallest heat of hydrogenation per mole? [JEE 1993]
- (A) 1-Butene (B) trans-2-Butene
 (C) cis-2-Butene (D) 1,3-Butadiene

- Q.3 In the following compounds: [JEE 1996]



The order of acidity is:

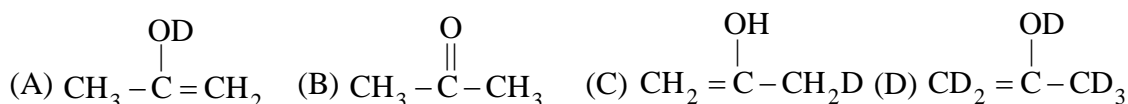
- (A) $III > IV > I > II$ (B) $I > IV > III > II$ (C) $II > I > III > IV$ (D) $IV > III > I > II$
- Q.4 The reaction of $CH_3-CH=CH-$  $-OH$ with HBr gives: [JEE 1998]



- Q.5 A solution of (+) 1-chloro-1-phenylethane in toluene racemizes slowly in the presence of small amount of $SbCl_5$ due to formation of: [JEE 1999]
- (A) carbanion (B) carbene (C) free radical (D) carbocation

- Q.6 An aromatic molecule will: [JEE 1999]
- (A) have $4n$ π electrons (B) have $(4n+2)$ π electrons
 (C) be planar (D) be cyclic

- Q.7 The enol form of acetone, after Prolonged treatment with D_2O , gives: [JEE 1999]

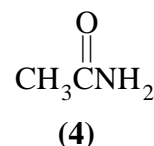
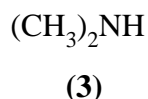
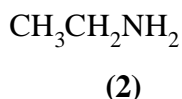
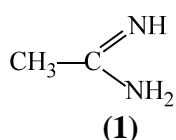


- Q.8 Amongst the following, the most basic compound is: [JEE 2000]
- (A) $C_6H_5NH_2$ (B) $p-NO_2-C_6H_4NH_2$ (C) $m-NO_2-C_6H_4NH_2$ (D) $C_6H_5CH_2NH_2$

- Q.9 S_N2 reaction at an asymmetrical carbon of a compound always gives: [JEE 2001]
- (A) enantiomer of the substrate (B) a product with opposite optical rotation
 (C) a mixture of diastereomers (D) a single stereo isomers

Q.10 The correct order of basicities of the following compounds is:

[JEE 2001]



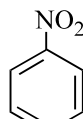
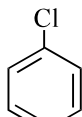
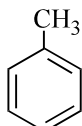
(A) $2 > 1 > 3 > 4$

(B) $1 > 3 > 2 > 4$

(C) $3 > 1 > 2 > 4$

(D) 1

Q.11 Identify the correct order of reactivity in electrophilic substitution reaction of the following compounds:



(A) $1 > 2 > 3 > 4$

(B) $4 > 3 > 2 > 1$

(C) $2 > 1 > 3 > 4$

(D) $2 > 3 > 1 > 4$ [JEE 2002]

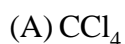
Q.12 Left to right sp^2 , sp^2 , sp , sp hybridization is present in:

[JEE 2003]

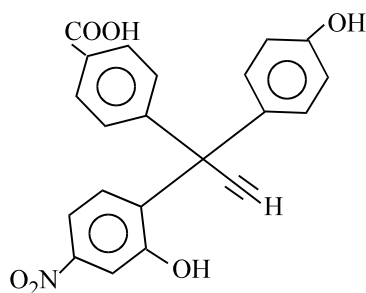
(A) $\text{H}_2\text{C}=\text{CH}-\text{C}\equiv\text{N}$ (B) $\text{H}_2\text{C}=\text{C}=\text{CH}-\text{CH}_3$ (C) $\text{HC}\equiv\text{C}-\text{C}\equiv\text{CH}$ (D) $\text{HC}\equiv\text{C}-\text{CH}=\text{CH}_2$

Q.13 Maximum dipole moment will be of:

[JEE 2003]

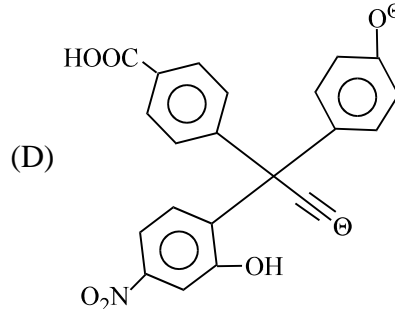
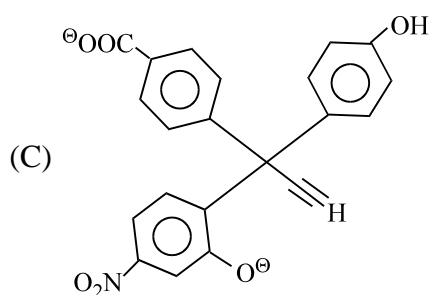
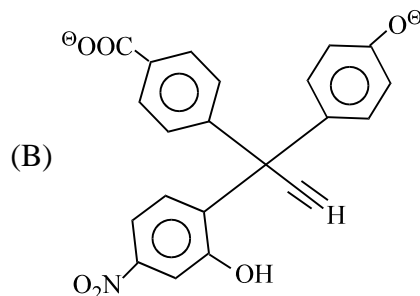
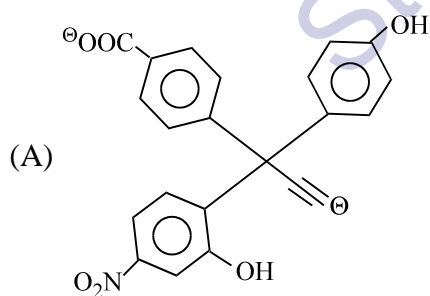


Q.14

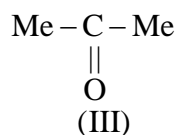
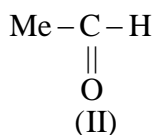
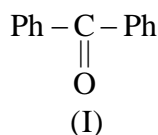


when X is made to react with 2 eq. of NaNH_2 the product formed will be:

[JEE 2003]

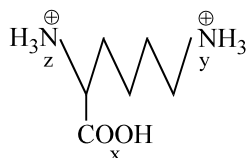


Q.15 Order of rate of reaction of following compound with phenyl magnesium bromide is: [JEE 2004]



- (A) I > II > III (B) II > III > I (C) III > I > II (D) II > I > III

Q.16

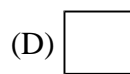
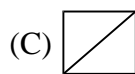
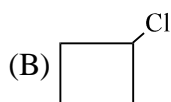
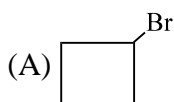


[JEE 2004]

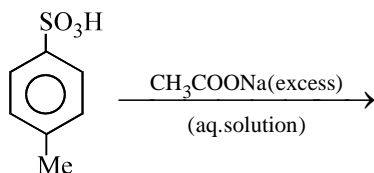
Correct order of acidic strength is:

- (A) x > y > z (B) z > y > x (C) y > z > x (D) x > z > y

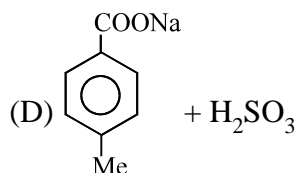
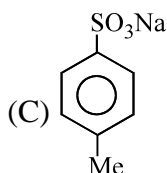
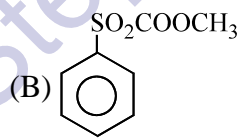
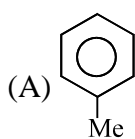
Q.17 1-Bromo-3-chloro cyclobutene on reaction with 2-equivalent of sodium in ether gives [JEE 2005]



Q.18



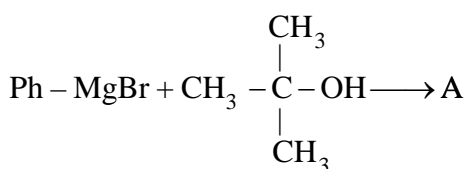
[JEE 2005]



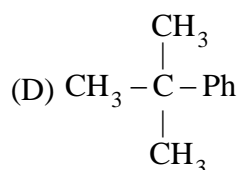
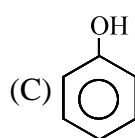
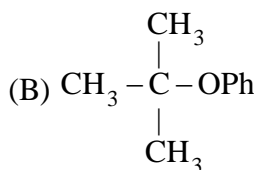
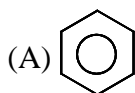
Q.19 Conversion of cyclohexanol into cyclohexene is most effective in [JEE 2005]

- (A) concentrated H₃PO₄ (B) concentrated HCl
(C) concentrated HCl / ZnCl₂ (D) concentrated HBr

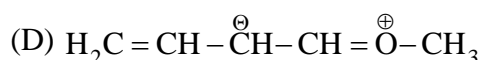
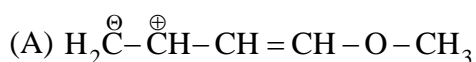
Q.20



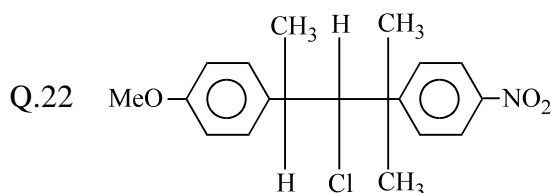
[JEE 2005]



Q.21 For 1-methoxy-1,3-butadiene, which of the following resonating structure is the least stable?

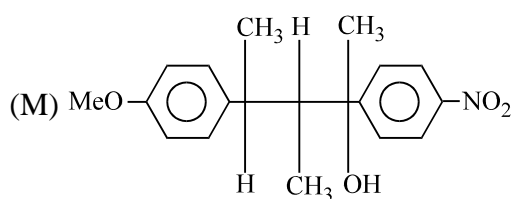
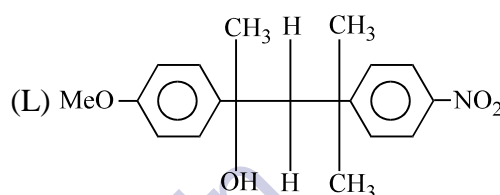
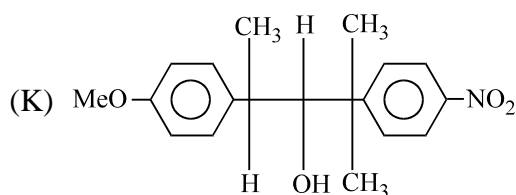


[JEE 2005]



[JEE 2005]

on hydrolysis in presence of acetone



(A) K & L

(B) only

(C) M only

(D) K & M

Q.23 When benzene sulfonic acid and p-nitrophenol are treated with NaHCO_3 , the gases released respectively are

[JEE 2006]

(A) SO_2 , NO_2

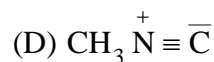
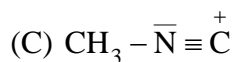
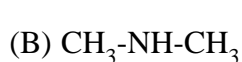
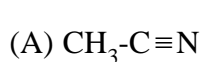
(B) SO_2 , NO

(C) SO_2 , CO_2

(D) CO_2 , CO_2

Q.24 $\text{CH}_3\text{NH}_2 + \text{CHCl}_3 + \text{KOH} \rightarrow$ Nitrogen containing compound + $\text{KCl} + \text{H}_2\text{O}$. Nitrogen containing compound is

[JEE 2006]



Q.25 (I) 1,2-dihydroxy benzene

(II) 1,3-dihydroxy benzene

[JEE 2006]

(III) 1,4-dihydroxy benzene

(IV) Hydroxy benzene

The increasing order of boiling points of above mentioned alcohols is

(A) $\text{I} < \text{II} < \text{III} < \text{IV}$

(B) $\text{I} < \text{II} < \text{IV} < \text{III}$

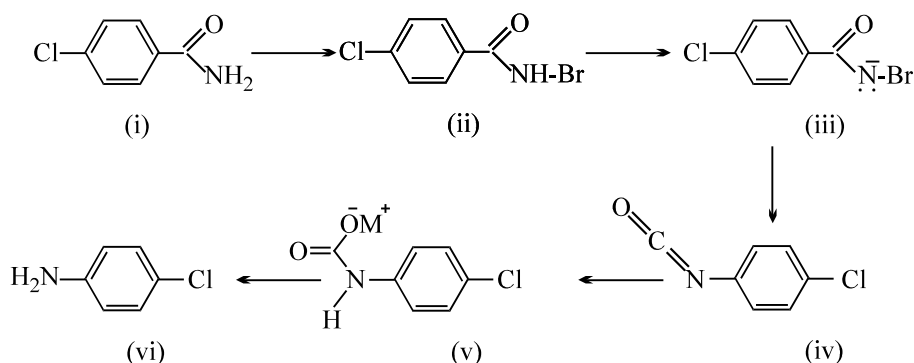
(C) $\text{IV} < \text{I} < \text{II} < \text{III}$

(D) $\text{IV} < \text{II} < \text{I} < \text{III}$

Question No. 26 to 28 (3 questions)

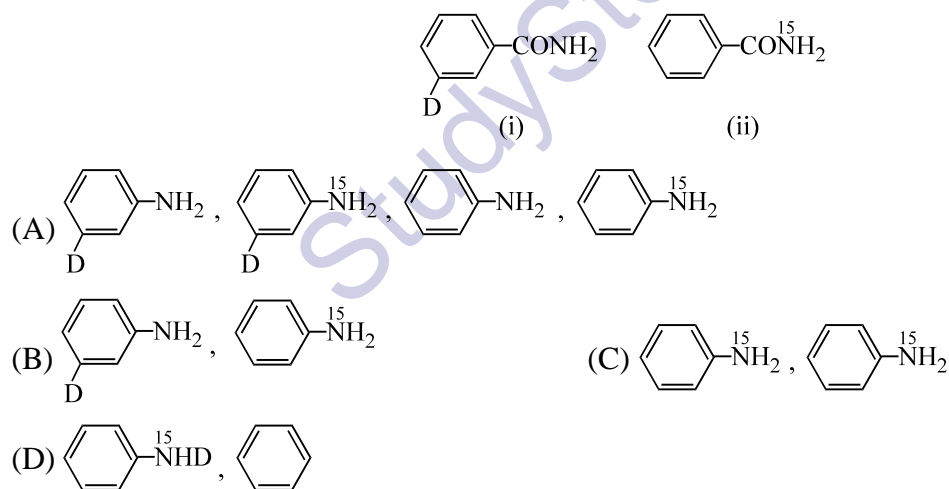
Comprehension I

RCONH_2 is converted into RNH_2 by means of Hofmann bromamide degradation.



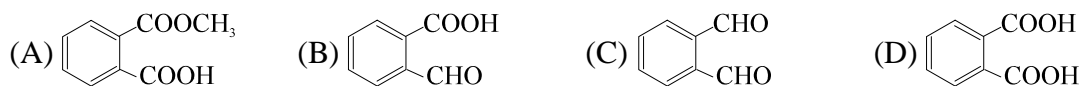
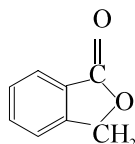
In this reaction, RCONHBr is formed from which this reaction has derived its name. Electron donating group at phenyl activates the reaction. Hofmann degradation reaction is an intramolecular reaction.

- Q.26 How can the conversion of (i) to (ii) be brought about? [JEE 2006]
 (A) KBr (B) $\text{KBr} + \text{CH}_3\text{ONa}$ (C) $\text{KBr} + \text{KOH}$ (D) $\text{Br}_2 + \text{KOH}$
- Q.27 Which is the rate determining step in Hofmann bromamide degradation? [JEE 2006]
 (A) Formation of (i) (B) Formation of (ii) (C) Formation of (iii) (D) Formation of (iv)
- Q.28 What are the constituent amines formed when the mixture of (i) and (ii) undergoes Hofmann bromamide degradation?



[JEE 2006]

- Q29.** Which of the following reactants on reaction with conc. NaOH followed by acidification gives the following lactone as the only product?



[JEE 2006]

- Q30.** The smallest ketone and its next homologue are reacted with NH_2OH to form oxime.
 (A) Two different oximes are formed (B) Three different oximes are formed
 (C) Two oximes are optically active (D) All oximes are optically active

[JEE 2006]

- Q31.** Match the following:

Column I

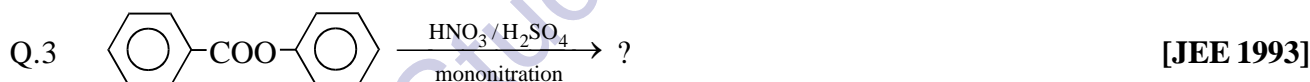
- (A) $\text{CH}_3\text{-CHBr-CD}_3$ on treatment with alc. KOH gives $\text{CH}_2=\text{CH-CD}_3$ as a major product.
 (B) Ph-CHBr-CH_3 reacts faster than Ph-CHBr-CD_3 .
 (C) $\text{Ph-CH}_2\text{-CH}_2\text{Br}$ on treatment with $\text{C}_2\text{H}_5\text{OD/C}_2\text{H}_5\text{O}$ gives Ph-CD=CH_2 as the major product.
 (D) $\text{PhCH}_2\text{CH}_2\text{Br}$ and $\text{PhCD}_2\text{CH}_2\text{Br}$ react with same rate.

Column II

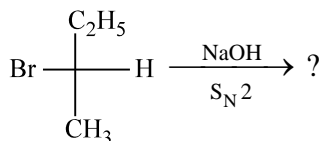
- (P) E_1 reaction
 (Q) E_2 reaction
 (R) $\text{E}_{1\text{cb}}$ reaction
 (S) First order reaction

[JEE 2006]

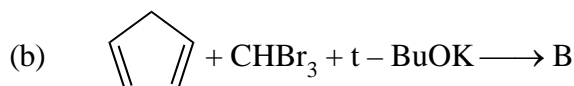
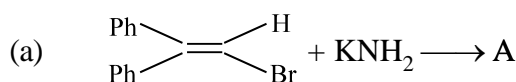
EXERCISE-IV (B)



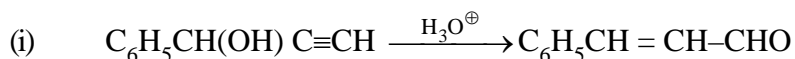
- Q.4** Draw the stereochemical structure of the products in the following reaction: [JEE 1994]

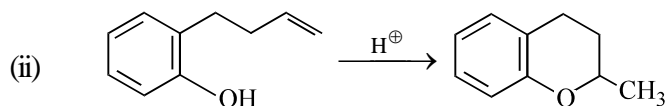


- Q.5** Complete the following, giving the structures of the principal organic products: [JEE 1997]



- Q.6** Write the intermediate steps for each of the following reaction. [JEE 1998]



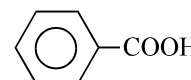
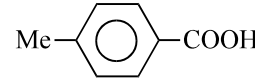
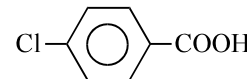
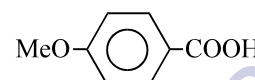



Q.7 Each of the following reaction gives two products. Write the structure of the products. [JEE 1998]

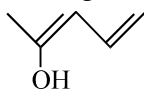


Q.8 Out of anhydrous AlCl_3 and hydrous AlCl_3 which is more soluble in diethyl ether? Explain with reason. [JEE 2003]

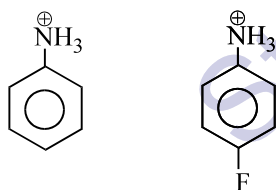
Q.9 Match K_a values with suitable acid:

K_a	Acid
(i) 3.3×10^{-5}	(a) 
(ii) 4.2×10^{-5}	(b) 
(iii) 6.3×10^{-5}	(c) 
(iv) 6.4×10^{-5}	(d) 
(v) 30.6×10^{-5}	(e) 

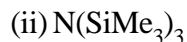
Q.10 Give resonating structures of following compound. [JEE 2003]



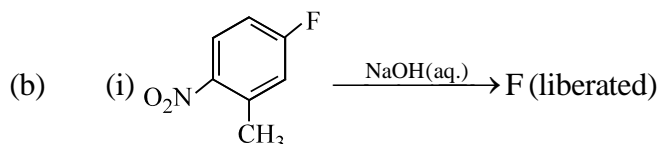
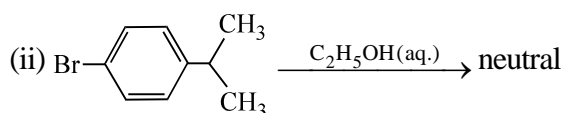
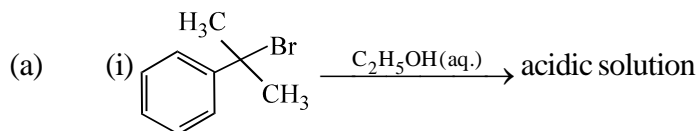
Q.11 Which of the following is more acidic and why? [JEE 2004]

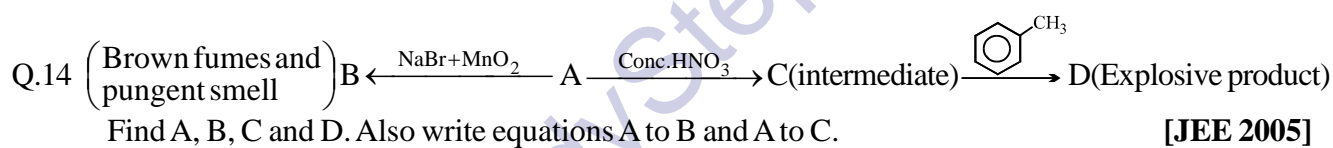
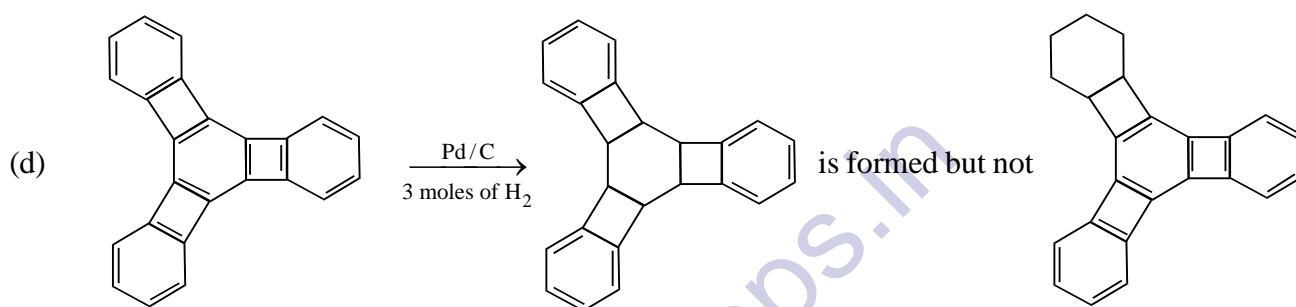
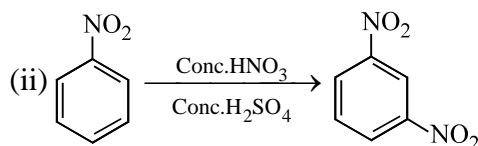
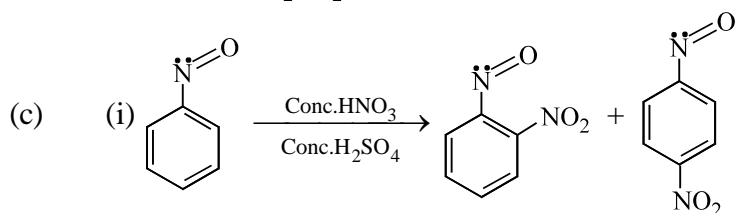
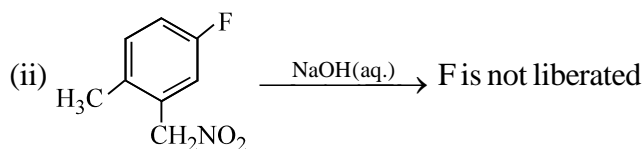


Q.12 Predict whether the following molecules are iso structural or not. Justify your answer. [JEE 2005]



Q.13 Give reasons:





Q.15 $\mu_{\text{obs}} = \sum \mu_i x_i$ [JEE 2005]

where μ_i is the dipole moment of stable conformer and x_i is the fraction of that conformer.

(a) Write stable conformer for $\text{Z}-\text{CH}_2-\text{CH}_2-\text{Z}$ in Newman's projection. If $\mu_{\text{solution}} = 1.0 \text{ D}$ and mole fraction of anti form = 0.82, find μ_{Gauche} .

(b) Write most stable meso conformer of $\begin{array}{c} \text{CHDY} \\ | \\ \text{CHDY} \end{array}$

If (i) $\text{Y} = \text{CH}_3$ about $\text{C}_2 - \text{C}_3$ rotation and (ii) $\text{Y} = \text{OH}$ about $\text{C}_1 - \text{C}_2$ rotation.

ANSWER KEY

EXERCISE-I

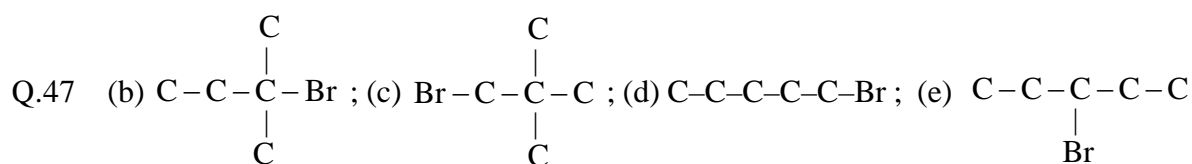
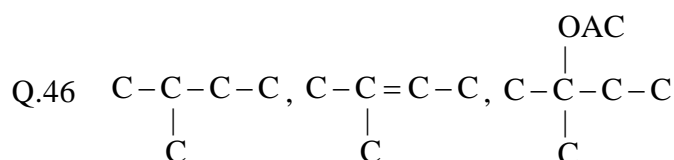
Q.1	D	Q.2	C	Q.3	B	Q.4	B	Q.5	B	Q.6	A	Q.7	A
Q.8	D	Q.9	A	Q.10	B	Q.11	A	Q.12	C	Q.13	C	Q.14	C
Q.15	C	Q.16	A	Q.17	B	Q.18	B	Q.19	C	Q.20	A	Q.21	D
Q.22	A	Q.23	C	Q.24	C	Q.25	D	Q.26	A	Q.27	D	Q.28	C
Q.29	A	Q.30	C	Q.31	B	Q.32	B	Q.33	C	Q.34	B	Q.35	B
Q.36	A	Q.37	A	Q.38	C	Q.39	B	Q.40	D	Q.41	B	Q.42	A
Q.43	A	Q.44	A	Q.45	A	Q.46	C	Q.47	C	Q.48	C	Q.49	A
Q.50	D	Q.51	D	Q.52	C	Q.53	C						

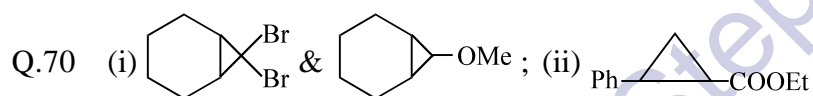
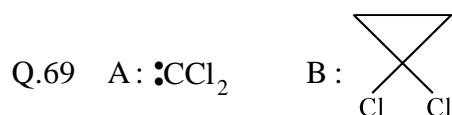
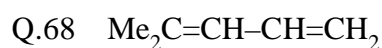
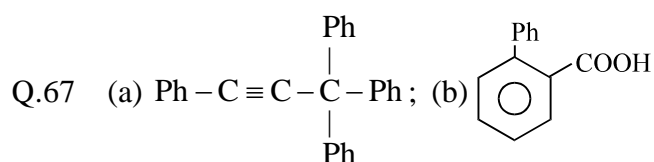
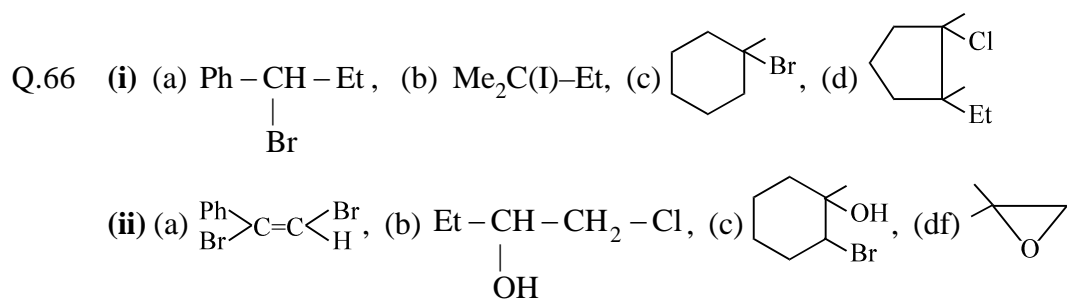
EXERCISE-II

Q.1	C	Q.2	A,D	Q.3	A,B,C,D	Q.4	A,B,C,D
Q.5	B,C,D	Q.6	A,B,D	Q.7	A,B,D	Q.8	C
Q.9	C,D	Q.10	A,B	Q.11	A,B	Q.12	A,D
Q.13	A,C,D	Q.14	C,D	Q.15	D	Q.16	A
Q.17	B,D	Q.18	D	Q.19	B,D	Q.20	A,C
Q.21	A,B,C	Q.22	B,C	Q.23	A,B	Q.24	A,C
Q.25	C	Q.26	A,C,D	Q.27	A,B,C	Q.28	D
Q.29	A,D	Q.30	B	Q.31	D		

EXERCISE-III

Q.1	3 > 2 > 1 > 4	Q.2	IV > I > II > III	Q.3	(a) II > I > III > IV ; (b) (ii)
Q.4	(a)	Q.5	$\text{C}-\text{C}-\text{C}-\text{C}-\text{Cl} > \underset{\text{C}}{\text{C}}-\text{C}-\text{C}-\text{Cl} > \text{C}-\text{C}-\underset{\text{C}}{\text{C}}-\text{Cl} > \underset{\text{C}}{\text{C}}-\underset{\text{C}}{\text{C}}-\text{Cl}$		
Q.6	(a) II, (b) I, (c) II	Q.7	(i) (a) II, (b) I, (c) II ; (ii) (a) II, (b) II, (c) I		
Q.8	(a) II, (b) I	Q.9	(a) I, (b) II, (c) I, (d) I	Q.10	(a) II, (b) I, (c) II, (d) II
Q.11	(a) II ; (b) II ; (c) I ; (d) II ; (e) II	Q.14	b, d, e, g, h	Q.15	a, c, e, f, g, h
Q.27		Q.38	(a) Et ₃ CO [⊖] ; (b) EtO [⊖]	Q.45	MeCOOMe

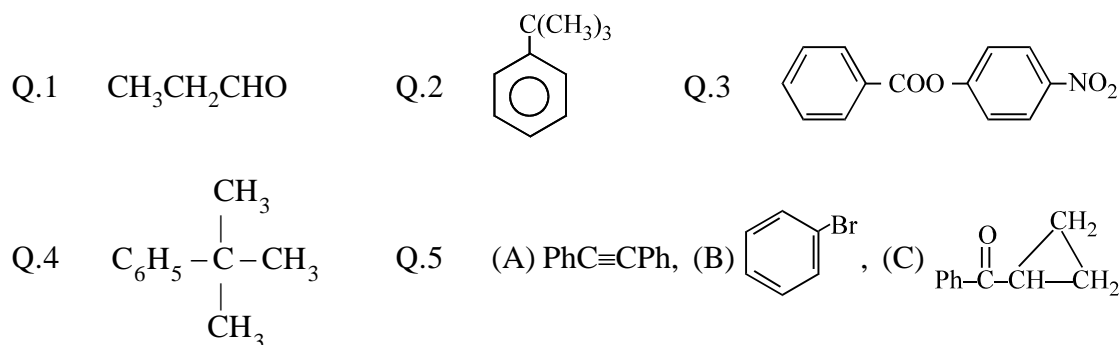


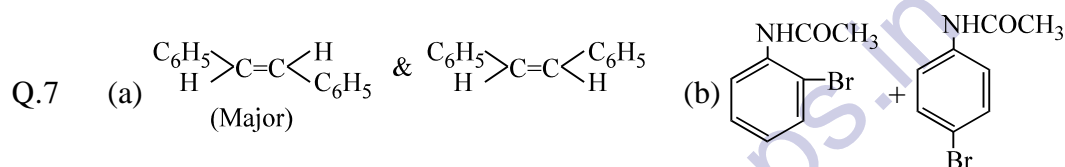
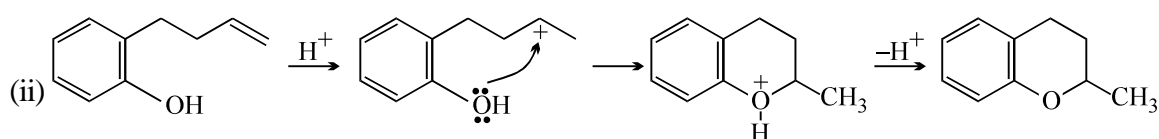
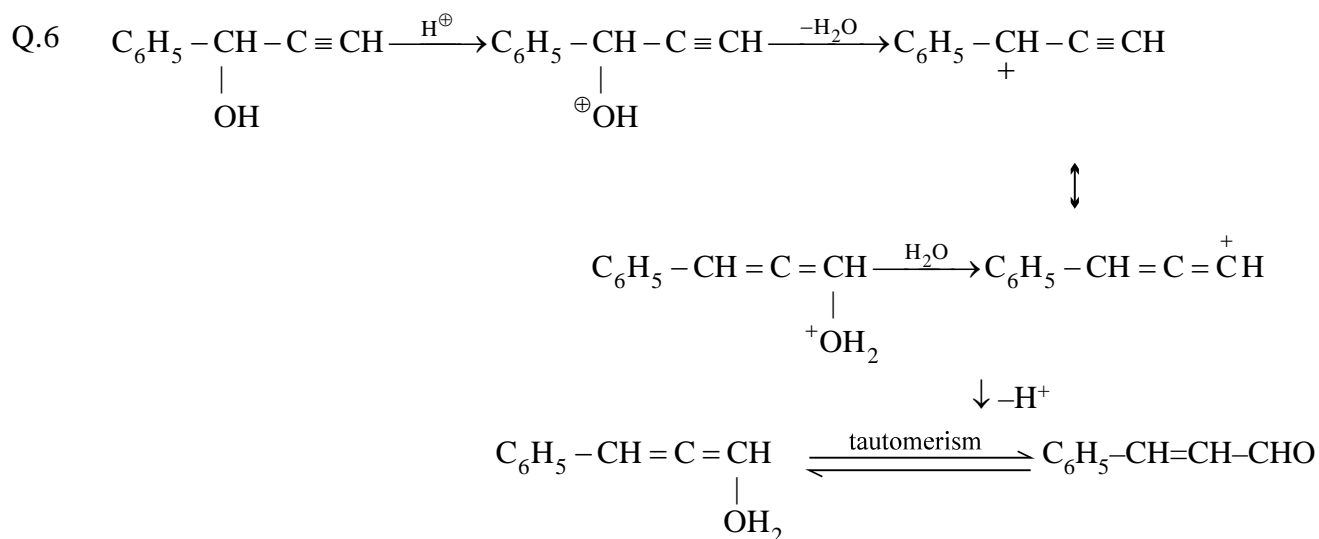


EXERCISE-IV (A)

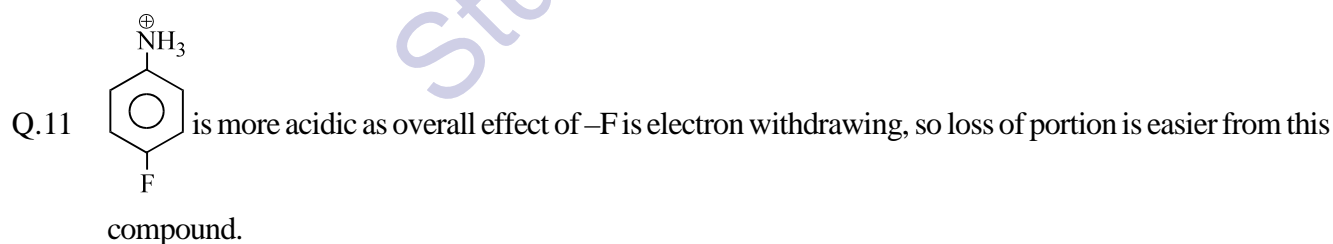
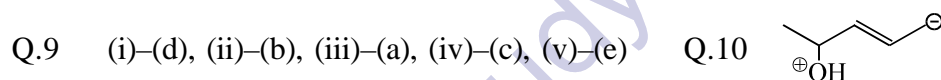
Q.1	A, C	Q.2	D	Q.3	D	Q.4	B	Q.5	D
Q.6	B, C, D	Q.7	D	Q.8	D	Q.9	D	Q.10	B
Q.11	C	Q.12	A	Q.13	D	Q.14	C	Q.15	B
Q.16	D	Q.17	C	Q.18	C	Q.19	A	Q.20	A
Q.21	C	Q.22	A	Q.23	D	Q.24	D	Q.25	C
Q.26	D	Q.27	D	Q.28	B	Q.29	C	Q.30	B
Q.32	A - Q; B - Q; C - R, S; D - P, S								

EXERCISE-IV (B)

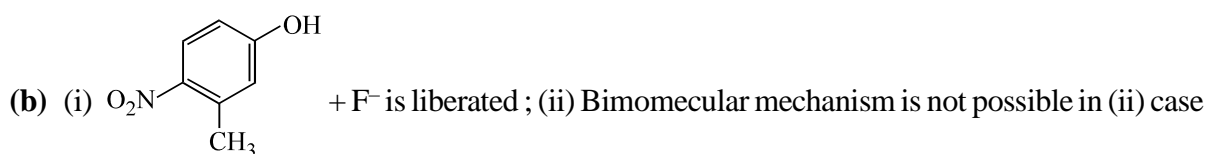
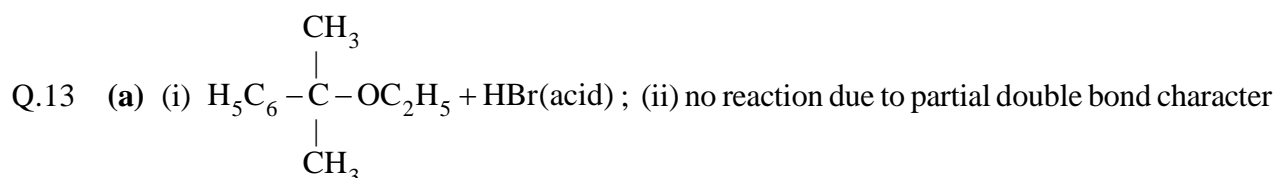




Q.8 Anhydrous AlCl_3 is more stable than hydrous AlCl_3 because it is having vacant 3p orbital of Al which can accept lone pair of electrons from oxygen of diethylether.

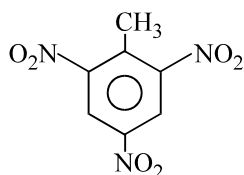


Q.12 Not. NMe_3 is trigonal pyramidal while $\text{N}(\text{SiMe}_3)_3$ is trigonal planar due to back bonding.



- (c) (i) due to presence of lone pair of nitrogen atom NO group is electron donating and ortho, para directing
 (ii) NO₂ group is electron withdrawing and meta directing
- (d) Due to reduction of central ring, three four membered antiaromatic rings become stable while on reduction of terminal ring only one antiaromatic ring can be stabilized.

Q.14 (A) H₂SO₄, (B) Br₂, (C) NO₂⁺, (D)



Q.15 (a) $\mu_{\text{Gauche}} = 5.55 \text{ D}$; (b) (i)

