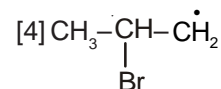
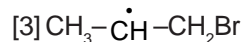
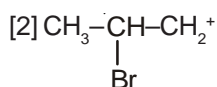
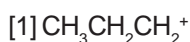


Solved Example

Q.1 The main intermediate formed in the reaction of propene with HBr in presence of peroxide, is



Ans. [3]

Sol. Reaction of propene with HBr in presence of peroxide is a free radical addition reaction, in this reaction $\text{CH}_3-\dot{\text{C}}\text{H}-\text{CH}_2\text{Br}$ is a stable secondary free radical. So the answer will be [3]

Q.2 The reaction of 2-chloropropane with alcoholic KOH is

[1] E1

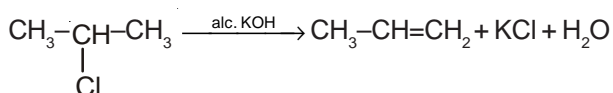
[2] E2

[3] S_N^1

[4] S_N^2

Ans. [2]

Sol. The reaction of 2-chloropropane with alcoholic KOH is



This is an elimination reaction, since 2-chloropropane is less ionised so it is an E2 reaction. Hence the answer will be [2].

Q.3 Which of the following is a true statement

[1] RCOOH is more stable than RCOO^-

[2] RCOO^- is more stable than RCOOH

[3] RCOOH and RCOO^- do not show resonating structures

[4] All of the above

Ans. [2]

Sol. RCOO^- is more stable than RCOOH due to resonance. So answer is [2]

Q.4 The electron attracting specie in the following is –

[1] $-\text{CN}$

[2] $-\text{NH}_2$

[3] $-\text{NHR}$

[4] $-\text{NHCOR}$

Ans. [1]

Sol. The groups having double or triple bonds are electron attracting. Hence $-\text{CN}$ is electron attracting and in rest of the species N-atom has lone pair of electrons. So the answer is [1].

Q.5 The possible mechanism of addition reaction between ethene and bromine in nonpolar medium would be

[1] Free radical addition

[2] Carbene addition

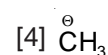
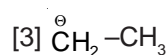
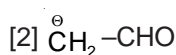
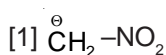
[3] Electrophilic addition

[4] Nucleophilic addition

Ans [1]

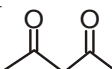
Sol. In non-polar solvent, the addition of bromine to ethene is explained by free radical mechanism.

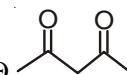
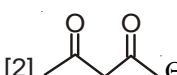
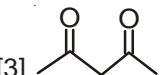
Q.6 Which carbanion is less stable than the other three -



Ans. [3]

Sol. Due to +I effect of CH_3 group $\text{CH}_2^- - \text{CH}_3$ is less stable.

Q.7 Compound :  on removal of proton gives a carbanion. The most stable carbanion should be

- [1]  [2]  [3]  [4] All the above **Ans. [3]**

Sol. In this case negatively charged carbon is present between two electron attracting groups. As such it is a stable carbanion.

Q.8 Most stable carbanion is

- [1] $\text{HC}\equiv\overset{\ominus}{\text{C}}$ [2] $\text{CH}_3-\overset{\ominus}{\text{C}}\equiv\text{C}$ [3] $\text{R}_2\overset{\ominus}{\text{C}}=\text{C}-\text{H}$ [4] $(\text{CH}_3)_3\overset{\ominus}{\text{C}}$ **Ans. [1]**

Sol. $\text{HC}\equiv\overset{\ominus}{\text{C}}$ is the most stable carbanion as it is formed easily [$\equiv\text{C}-\text{H}$] bond is more polar

Q.9 $\overset{\oplus}{\text{C}}\text{H}_2-\text{O}-\text{H} \rightarrow \text{CH}_2=\overset{\oplus}{\text{O}}-\text{H}$

I II

The stability order of above structure is -

- [1] I > II [2] II > I [3] I = II [4] None **Ans. [2]**

Sol. In IInd structure carbon completes its octet. Hence it is more stable

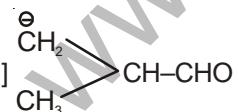
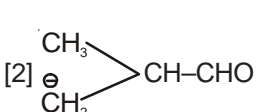
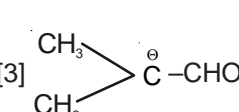
Q.10 Bond fission (I) $\text{CH}_4 \rightarrow \text{CH}_3\cdot + \text{H}\cdot$ and (II) $\text{CH}_3\cdot \rightarrow \cdot\text{CH}_2 + \text{H}\cdot$ about (I) and (II) the false statement is

- [1] $\cdot\text{CH}_3$ and $\cdot\text{CH}_2$ both are free radicals [2] Bond dissociation energy II > I
[3] $\text{CH}_3\cdot$ and $\cdot\text{CH}_2$ have similar geometry [4] Both bond fission are homolytic

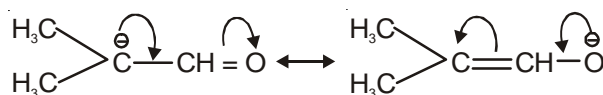
[Ans. [3]

Sol. The geometry of $\text{CH}_3\cdot$ is trigonal planar while the geometry of $\cdot\text{CH}_2$ is linear and plane triangle.

Q.11 If $\text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CHO}$ gives up proton the most-stable carbanion would be

- [1]  [2]  [3]  [4] All the above **Ans. [3]**

Sol. This carbanion shows resonance :



Q.12 pK_a values of HCN, CH_3COOH and HF respectively are 9.2, 4.7 and 3.2. Evaluate pK_b for CN^- , CH_3COO^- and F^-

- [1] 9.2, 4.7, 16.0 [2] 4.8, 9.3, 10.8 [3] 7.2, 3.7, 3.2 [4] 2.2, 2.3, 3.8

Ans. [2]

Sol. We know that : $pK_a + pK_b = 14$

$$\therefore pK_b = 14 - pK_a$$

$$\therefore \text{CN}^- (14-9.2), \text{CH}_3\text{COO}^- (14-4.7), \text{F}^- (14-3.2), \text{or CN}^- (4.8), \text{CH}_3\text{COO}^- (9.3), \text{F}^- (10.8)$$

Q.13 The order of stability of the following carbanion is :



[1] I > II > III > IV

[2] I > III > II > IV

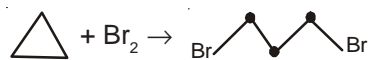
[3] IV > III > II > I

[4] III > IV > I > II

Ans. [4]

Sol. I can have maximum 3 hyperconjugative structures, II have maximum 5, III have 2, IV have 1, conjugative structure. So answer is [4]

Q.14 Classify the reaction:



[1] only addition

[2] Addition and redox

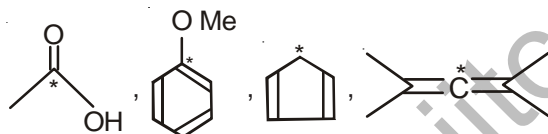
[3] elimination

[4] Isomerisation

Ans. [2]

Sol. Br add to two carbon atom of the ring. Here C is oxidised and Br is reduced.

Q.15 Correct set of hybridisation state of the starred carbon atom respectively is -



[1] sp^2 , sp^2 , sp^3 , sp

[2] sp^3 , sp^2 , sp^2 , sp

[3] sp^3 , sp , sp , sp^2

[4] sp^2 , sp , sp^2 , sp^2

Ans. [1]

Sol. Represent ion of the correct set of hybridisation state of starred carbon atom is. [1]

Exercise # 1

- Q.1** According to Kekule
[1] carbon is tetravalent
[2] Carbon can combine with two monovalent and one bivalent atom
[3] Carbon can combine with two bivalent atoms [4] All of the above
- Q.2** In the formation of propene from propyl carbonium ion
[1] Addition of proton takes place [2] Addition of hydride ion takes place
[3] Proton is eliminated [4] Hydride ion is eliminated
- Q.3** Number of free radicals formed on removal of H-atom from C_4H_{10} is
[1] 1 [2] 2 [3] 3 [4] 4
- Q.4** Specie $(CH_3)_3C^-$ is
[1] Carbanion [2] Carbonium ion [3] Carbene [4] Carbocation
- Q.5** Specie $C_6H_5-CH=CH^+$ is more stable than
[1] $CH_3CH_2^+$ [2] $(CH_3)_3C^+$ [3] $CH_3CH_2CH_2^+$ [4] All of the above
- Q.6** Shape of ethylene molecule is
[1] Tetrahedral [2] Pyramidal [3] Planar [4] Linear
- Q.7** The reason for the high reactivity of free radical is
[1] its ionic behaviour [2] odd electrons present on it
[3] electron pair present on it [4] none of the above
- Q.8** In elimination reaction
[1] one σ bond breaks and two new π bonds are formed
[2] one π bond breaks and two new σ bonds are formed
[3] two σ bonds break and a π bond is formed
[4] two π bonds break and a σ bond is formed
- Q.9** In electromeric effect, when an electrophilic attacks on alkene, transference of take place
[1] σ -electrons [2] π -electrons [3] σ - and π -electrons both [4] none of the above
- Q.10** Reaction of bromine with an alkene is an example of
[1] Elimination [2] Electrophilic addition
[3] Nucleophilic substitution [4] Free radical addition
- Q.11** In electromeric effect
[1] Heterolytic fission of electron pair takes place
[2] Electron pair is transferred between vicinal atoms
[3] Both the above
[4] None of the above

- Q.12** Which of the following is a true statement
 [1] The reaction in which a π bond breaks and two new σ bonds are formed is an addition reaction.
 [2] The reaction in which two σ bonds break and a new π bond is formed is an elimination reaction
 [3] Conversion of a compound in its isomer is a reaction of intramolecular change
 [4] All of the above
- Q.13** In the reaction - $R-CO-R + NaHSO_3 \rightarrow R_2C(OH)SO_3Na$
 [1] Electrophilic substitution takes place by Na^+ [2] Electrophilic addition takes place by Na^+
 [3] Nucleophilic addition takes place by SO_3H^- [4] Nucleophilic addition takes place by SO_3^{2-}
- Q.14** Halogenation of alkanes is
 [1] Electrophilic substitution [2] Nucleophilic substitution
 [3] Free radical substitution [4] Oxidation
- Q.15** +I and -I effect of an atom is in comparison of
 [1] Fluorine [2] Alkyl radical [3] Hydrogen [4] Oxygen
- Q.16** Which of the following behaves like a nucleophile
 [1] ^-OH [2] CN^- [3] ROH [4] all of the above
- Q.17** Which of the following is a correct statement
 [1] Inductive effect is shown by the compounds which do not have single bond
 [2] Electromeric effect is shown by the compound which do not have double or triple bonds
 [3] Electromeric effect is shown by compounds only when a reagent attacks it
 [4] All of the above
- Q.18** The structure of ter-butyl carbonium ion is
 [1] Pyramidal [2] Trigonal planar [3] Tetrahedral [4] Square planar
- Q.19** State of hybridisation of carbon atom number 2 in 1,2-butadiene is
 [1] sp^3 [2] sp^2 [3] sp [4] None of the above
- Q.20** Which of the following compounds is least acidic
 [1] CF_3COOH [2] CBr_3COOH [3] CCl_3COOH [4] Cl_3COOH
- Q.21** Ethyl amine is more basic than ammonia. Its reason is
 [1] In ethyl amine ethyl group attracts lone pair of electrons present on nitrogen atom
 [2] Ethyl amine is more soluble in water than ammonia
 [3] In ethyl amine, ethyl group has +I effect
 [4] In Ethyl amine ethyl group has -I effect
- Q.22** Increasing order (least basic first) of basic strength is shown by the set
 [1] $C_6H_5NH_2$, NH_3 , CH_3NH_2 [2] $C_6H_5NH_2$, CH_3NH_2 , NH_3
 [3] NH_3 , $C_6H_5NH_2$, CH_3NH_2 [4] CH_3NH_2 , $C_6H_5NH_2$, NH_3
- Q.23** All carbon and hydrogen atoms are in the same plane in a cyclic hydrocarbon. Bond length of all C-C bonds is same which is less than 1.54\AA and more than 1.34\AA . The bond angle C-C-C in the hydrocarbon will be
 [1] $109^\circ 28'$ [2] 100° [3] 180° [4] 120°

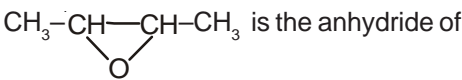


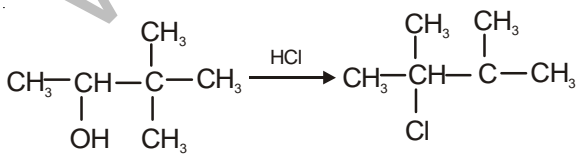
- Q.24** Which of the following compounds will give nucleophilic substitution unimolecular (S_N^1) most easily
 [1] Propyl chloride [2] 2-chloropropane
 [3] 2-chloro-2-methyl propane [4] 2-chloro-2-methyl butane
- Q.25** Strongest acid in the following is
 [1] $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$ [2] $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{COOH}$
 [3] $\text{CH}_3\text{CH}_2\text{CH}(\text{Br})\text{COOH}$ [4] CF_3COOH
- Q.26** What is true for inductive effect
 [1] It is permanently present in the compound
 [2] It develops in the compound at the time of attack of a reagent
 [3] It develops in the compound only when electron attracting group is present
 [4] none of the above
- Q.27** The specie obtained after removing hydride ion from methane molecule, is
 [1] Methyl radical [2] Carbonium ion [3] Carbanion [4] Methyl group
- Q.28** For S_N^2 reaction
 [1] Reaction rate does not depend on the concentration of nucleophile
 [2] Reaction rate does not depend on the concentration of reacting molecule
 [3] Reaction rate depends on the concentration of both reacting molecules and nucleophile
 [4] Reaction rate neither depends on the concentration of reacting molecules nor the concentration of nucleophile
- Q.29** Electromeric effect in an organic compound is
 [1] Temporary effect [2] Permanent effect [3] Temporary-permanent effect [4] None of these
- Q.30** Which of the following classes of compounds does not have π bond
 [1] Aromatic hydrocarbons [2] Saturated hydrocarbons
 [3] Unsaturated hydrocarbons [4] Arenes
- Q.31** In which of the following compounds carbon-carbon bond length is shortest.
 [1] $\text{BrCH}_2\text{—CH}_2\text{Br}$ [2] $\text{C}_2\text{H}_5\text{OH}$ [3] C_2H_2 [4] $\text{H}_2\text{C} = \text{CHCl}$
- Q.32** Which of the following statements is false
 [1] Methyl radical is less stable than ethyl radical
 [2] Benzyl radicals is less stable than alkyl radical
 [3] Odd number of electrons are present on C-atom in a free radical
 [4] C is sp^2 hybridised in $^+\text{CH}_3$
- Q.33** Atom or group which does not show inductive effect is
 [1] $(\text{CH}_3)_3\text{C}$ [2] F [3] H [4] $-\text{CN}$
- Q.34** In which of the following reactions free radicals are not formed
 [1] Electrolysis of an aqueous solution of potassium salt of a fatty acid
 [2] By heating methane with chlorine at $300\text{--}400^\circ\text{C}$
 [3] Reaction of benzene with chlorine in the presence of Fe
 [4] Pyrolysis of propane

- Q.35** Which of the following statements is true
 [1] Reaction of ethyl iodide with KCN is S_N1 reaction
 [2] Reaction of ethyl iodide with KOH (alc) is E_1 reaction
 [3] Reaction of 2-chloro-2-methyl propane with ethanolic sodium ethoxide is $E1$ reaction
 [4] None of these
- Q.36** Ethylene has two types of bonds (σ and π), which one of these two is stronger
 [1] σ -bond [2] π -bond [3] both are equally strong [4] None of these
- Q.37** According to Label & vant Hoff, the four valencies of carbon are directed towards four corners of a regular tetrahedron. The bond angle between two valencies is
 [1] $109^\circ 28'$ [2] 104.5° [3] 107.5° [4] 90°
- Q.38** Which is a false statement
 [1] Boiling point of salicyl aldehyde is less than p-hydroxy acetaldehyde
 [2] m-nitrophenol is more acidic than p-nitrophenol
 [3] C–C single bond length between phenyl and methyl groups in toluene is shorter than the C–C single bond length in ethane
 [4] None of these
- Q.39** Enolic form of acetone contains
 [1] 9σ bonds, 1π bond and 2 lone pairs [2] 8σ bonds, 2π bond and 2 lone pairs
 [3] 10σ bonds, 1π bond and 1 lone pairs [4] 9σ bonds, 2π bond and 1 lone pairs
- Q.40** Maximum inactive free radical in the following is
 [1] \dot{F} [2] $C_6H_5\dot{C}H_2$ [3] $(C_6H_5)_3\dot{C}$ [4] $\dot{C}H_3$
- Q.41** Specie used in aromatic sulphonation is
 [1] SO_2^+ [2] HSO_4^- [3] $H_3SO_4^+$ [4] SO_3
- Q.42** Which of the following will form a free radical most easily
 [1] Isopropyl benzene [2] Ethane
 [3] 1,2-diphenyl ethane [4] Hexaphenyl ethane
- Q.43** Which of the following statements is false
 [1] p-chloro benzaldehyde gives nucleophilic substitution easily as compared to chlorobenzene
 [2] Formation of aniline by the reaction of chlorobenzene with ammonia in presence of cuprous oxide is a nucleophilic substitution
 [3] C–Cl bond in chlorobenzene is shorter than C–Cl bond in chloro-ethane
 [4] Allyl chloride gives nucleophilic substitution reaction with difficulty as compared to chlorobenzene
- Q.44** Pair of nucleophiles in the following is
 [1] Br^+ and SO_3 [2] ROH and $SnCl_2$ [3] RNH_3^+ and $SnCl_2$ [4] $ZnCl_2$ and $SnCl_4$

- Q.45** Conversion of phenyl hydroxyl amine to p-amino phenol is an example of
 [1] Molecular rearrangement [2] Electrophilic substitution
 [3] Tautomerism [4] Nucleophilic substitution
- Q.46** C–H bond length in ethane, ethene, ethyne is
 [1] Equal in all the three compounds [2] Maximum in ethane
 [3] Maximum in ethene [4] Maximum in ethyne
- Q.47** The correct order of basic character for
 (a) CH_3NH_2 (b) $(\text{CH}_3)_2\text{NH}$ [3] $(\text{CH}_3)_3\text{N}$ is :-
 [1] $a = b = c$ [2] $c < b > a$ [3] $a > b > c$ [4] $c = b > a$
- Q.48** Supposing the geometry of $\text{CH}_3\cdot$ free radical is planar, the unpaired electron would be in the
 [1] 2s orbital [2] $2p_x$ orbital [3] $2p_y$ orbital [4] $2p_z$ orbital
- Q.49** $\text{RCH}_2\text{Cl} + \overset{\ominus}{\text{O}}\text{H}^- \rightarrow \text{RCH}_2\text{OH} + \overset{\ominus}{\text{C}}\text{l}$ reaction follows $\text{S}_{\text{N}}2$ mechanism. Which of the following species will be formed as an intermediate
 [1] Carbonium ion [2] Carbanion
 [3] Pentavalent carbon in the transition state [4] Carbene
- Q.50** Least stable carbanion is :
 [1] $\overset{\ominus}{\text{C}}\text{H}_3$ [2] $\boxed{\ominus \oplus} - \overset{\ominus}{\text{C}}\text{H}_2$ [3] $\boxed{\oplus \ominus} - \overset{\ominus}{\text{C}}\text{H}_2$ [4] $\text{CH}_3 - \overset{\ominus}{\text{C}}\text{H}_2$

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

Exercise # 2

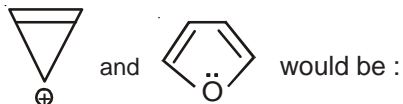
- Q.1** In which of the following compounds not all the atoms show zero formal charge :
- [1] $\text{CH}_3\text{-CN}$ [2] $\text{CH}_3\text{-NC}$ [3] $(\text{CH}_3)_3\text{N}$ [4] $\text{CH}_3\text{-ONO}$
- Q.2** $\text{CH}_3\text{-CH-O-CH-CH}_3$ is the anhydride of
- 
- [1] 1,4-Butane diol [2] 1,2-Butane diol [3] 2,3-Butane diol [4] 1,3-Butane diol
- Q.3** What is the geometry of the product of CH_3CHO and HCN :
- [1] Plane triangle [2] Trigonal pyramidal [3] Tetrahedral [4] Linear
- Q.4** Which one is Lewis acid :
- [1] Mercaptide ion [2] Isopropyl carbanion [3] Diethyl sulphide [4] Ferric chloride
- Q.5** How many primary, secondary and tertiary free radicals can be written for $\text{C}_4\text{H}_9\cdot$
- | | | |
|-------|---|---|
| P | S | T |
| [1] 1 | 1 | 2 |
| [2] 2 | 1 | 1 |
| [3] 2 | 0 | 1 |
| [4] 1 | 2 | 1 |
- Q.6** Proton donation tendency becomes minimum if E in the E-COOH is replaced by
- [1] $-\text{CHCl}_2$ [2] $-\text{CH}_2\text{Cl}$ [3] $-\text{CCl}_3$ [4] $-\text{CHF}_2$
- Q.7** Singlet methylene is
- [1] Lewis base [2] Diamagnetic [3] Nucleophile [4] Paramagnetic
- Q.8** A group or atom exhibits inductive effect through
- [1] π -Electrons [2] σ -Electrons [3] σ and π electrons [4] None of the above
- Q.9** Which of the following reactions is classified as substitution reactions
- | Reactant | Reagent | Product |
|---|-----------------------------------|---|
| [1]  | $\text{H}_2\text{Cr}_2\text{O}_7$ |  |
| [2] $\text{CH}_3\text{-CHO}$ | NH_2NH_2 | $\text{CH}_3\text{CH=N.NH}_2$ |
| [3] $(\text{CH}_3)_3\text{C-OH}$ | H_2SO_4 | $(\text{CH}_3)_2\text{C=CH}_2$ |
| [4] None of the above | | |
- Q.10** Which of the following mechanistic step does not involve for the reaction
- 
- [1] Protonation of OH [2] Elimination of water molecule
- [3] Attack of Cl^- on the carbocation formed [4] Attack of Cl^- on the rearranged carbocation
- Q.11** Maximum resonating structure can be formulated for the free radical [Where $\phi = \text{C}_6\text{H}_5$]
- [1] $\phi - \dot{\text{C}}\text{H} - \phi$ [2] $\text{CH}_2=\text{CH}-\dot{\text{C}}\text{H}_2$ [3] $\phi - \dot{\text{C}}\text{H}_2$ [4] $\phi - \dot{\text{C}}\text{H} - \text{CH}_3$

Q.12 Number of σ and π bonds in the following compounds would be :



- [1] 19 σ and 3 π [2] 19 σ and 2 π [3] 18 σ and 2 π [4] 17 σ and 2 π

Q.13 Number of π -electrons present in the species :



- [1] 2, 4 [2] 1, 4 [3] 2, 6 [4] 1, 6

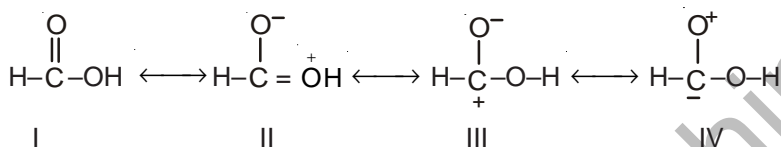
Q.14 Even on addition of proton the hybridisation state of central atom remains unaltered :

- [1] OH^- [2] NH_2^- [3] CH_3^- [4] All of these

Q.15 Which of the following acids has the smallest dissociation constant ?

- [1] $\text{CH}_3\text{CHF}\text{COOH}$ [2] $\text{FCH}_2\text{CH}_2\text{COOH}$ [3] $\text{BrCH}_2\text{CH}_2\text{COOH}$ [4] $\text{CH}_3\text{CHBr}\text{COOH}$

Q.16 Formic acid is considered as a resonance hybrid of the four structures



Which of the following order is correct for the stability of the four contributing structures.

- [1] I > II > III > IV [2] I > II > IV > III [3] I > III > II > IV [4] I > IV > III > II

Q.17 Examine the followings two structures for the anilinium ion and choose the correct statement from the ones given below



- [1] II is not an acceptable canonical structure because carbonium ions are less stable than ammonium ion
 [2] II is not an acceptable canonical structure because it is non-aromatic
 [3] II is not an acceptable canonical structure because the nitrogen has 10 valence electrons
 [4] II is an acceptable canonical structure

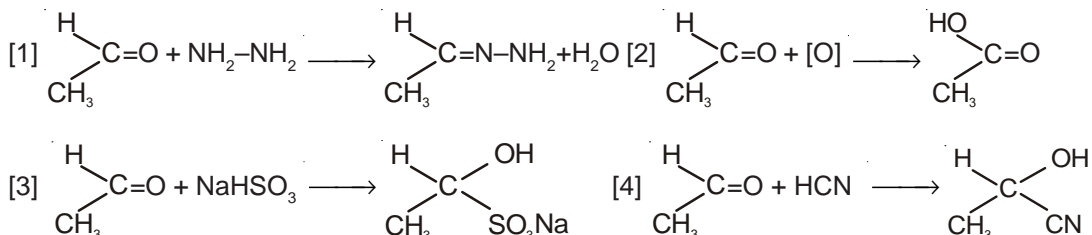
Q.18 A nucleophile must necessarily have

- [1] an overall positive charge [2] an overall negative charge
 [3] an unpaired electron [4] a lone pair of electrons

Q.19 Which of the following should exert greater hyperconjugative effect than the remaining three

- [1] CH_3^- [2] $(\text{CH}_3)_3\text{C}^-$ [3] $(\text{CH}_3)_2\text{CH}^-$ [4] C_2H_5^-

Q.20 Which of the following reactions does not involve nucleophile addition



- Q.21** Which of the following is the process of cleavage of the covalent bond in Kolbe electrolytic synthesis
 [1] Heterolysis [2] Free radical fission [3] Hydrolysis [4] Ionization
- Q.22** Which of the following is the reactive intermediate species formed during Markownikoff addition of HCl on ethylene
 [1] Vinyl chloride [2] Ethyl cation [3] Ethyl free radical [4] Ethyl carbanion
- Q.23** Which of the following should be more favourable condition for unimolecular nucleophilic substitution mechanism
 [1] Presence of a primary alkyl halide substrate [2] Presence of a polar medium
 [3] Presence of a peroxide [4] Presence of a neutral nucleophile
- Q.24** Formation of propanenitrile by the reaction of potassium cyanide on ethyl chloride is an example of the following reaction mechanism
 [1] S_N1 [2] E2 [3] S_N2 [4] E1
- Q.25** Select the set of the substituent groups, which exert M and negative inductive effects
 [1] -CCl₃, -COOH, -CN [2] -CH₃, -Cl, -F [3] -SO₃H, -OCH₃, -CHO [4] -NO₂, -COCl, -NH₂
- Q.26** Which of the following species sulphonates the benzene ring ?
 [1] SO₃⁻² [2] SO₂ [3] SO₃ [4] SO₄
- Q.27** How does hydrobromic acid react with propene in the presence of small amount of oxygen
 [1] Through alkyl free radical intermediate [2] According to Markownikoff rule
 [3] Through ionic mechanism [4] Through free radical mechanism
- Q.28** Which of the following is the decreasing order of the ease of S_N2 mechanism in the alkyl halides given below
 (I) (CH₃)₃C-Cl (II) CH₃-Cl (III) CH₃CH₂-Cl (IV) (CH₃)₂CH-Cl
 [1] I > III > II > IV [2] III > IV > II > I [3] II > III > IV > I [4] II > I > III > IV
- Q.29** Which of the following is not properly matched
- | | |
|---|---------------------------|
| [1] (CH ₃) ₃ CBr $\xrightarrow{\text{OH}^-}$ (CH ₃) ₃ C-OH | S _N 1 Reaction |
| [2] C ₆ H ₆ + RX $\xrightarrow{\text{AlCl}_3}$ C ₆ H ₅ -R | Electrophilic addition |
| [3] $\begin{array}{c} \text{CH}_2-\text{CH}_3 \\ \\ \text{CH}=\text{CH}_2 \end{array} + \text{HBr} \xrightarrow{\text{peroxide}} \begin{array}{c} \text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_2-\text{CH}_2\text{Br} \end{array}$ | Free radical addition |
| [4] $\text{CH}_3\text{CH}_2\text{CH}_3 \xrightarrow{\text{h}\nu} \begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ \\ \text{Cl} \end{array} + \text{Cl}_2$ | Free radical substitution |
- Q.30** Which of the following reactions can be used to convert an alkyl halide to an alcohol
 [1] Elimination [2] Nucleophilic substitution
 [3] Dehydrohalogenation [4] Nucleophilic addition
- Q.31** Formation of an alcohol by the reaction of aqueous caustic alkali on ter-butyl bromide is an example of
 [1] bimolecular nucleophilic substitution [2] nucleophilic addition
 [3] unimolecular nucleophilic substitution [4] electrophilic substitution
- Q.32** Carbanion can be formed by
 [1] homolytic fission of carbon-carbon bond [2] heterolytic fission of carbon-metal covalent bond
 [3] heterolytic fission of carbon-halogen covalent bond
 [4] abstraction of hydride ion from carbon-hydrogen bond

- Q.33** Which of the following pairs of names depicts the type of representative reaction of carbonyl compounds and the type of reagent that first attacks the carbonyl group respectively
- [1] Substitution, electrophile [2] Addition, nucleophile
[3] Addition, electrophile [4] Substitution, nucleophile
- Q.34** Which of the following compounds should have lower rate of nucleophilic addition than the remaining three
- [1] Methanal [2] Ethanal [3] Propanone [4] Propanal
- Q.35** Addition of HI on propene in the presence of a peroxide takes place by the following mechanism
- [1] Free radical addition [2] Electrophilic substitution
[3] Electrophilic addition [4] Nucleophilic addition
- Q.36** Addition of hydrochloric acid on vinyl chloride undergoes the following mechanism
- [1] Electrophilic addition [2] Peroxide effect
[3] Markownikoff's first rule [4] Nucleophilic addition
- Q.37** What is the cause of the experimental value of molecular weight of acetic acid being twice the value calculated for one molecule
- [1] Intramolecular bonding [2] Molecular rearrangement
[3] Intermolecular hydrogen bonding [4] Condensation polymerization
- Q.38** When a hydrogen atom of ammonia is substituted by a methyl group, there is
- [1] a decrease in steric hindrance effect [2] a change in the type of hybridization on nitrogen atom
[3] an increase in the base strength [4] an increase in the acid strength
- Q.39** Acetamide is neutral to litmus due to
- [1] positive inductive effect of methyl group [2] formation of weak acid and weak base by hydrolysis
[3] resonance which decreases proton-donor as well as proton-acceptor capacity
[4] its formation by reaction of acetic acid and ammonia
- Q.40** Which of the following is the basic cause of electrophilic substitution on benzene ring
- [1] Presence of an electrophile attracting aromatic sextet
[2] Saturation of the ring [3] Presence of three double bonds
[4] Presence of three pi bonds
- Q.41** Benzene can be converted to toluene by the attack of the following species
- [1] $-\text{CH}_3$ [2] $\overset{\oplus}{\text{C}}\text{H}_3$ [3] $\text{CH}_3\cdot$ [4] $:\overset{\ominus}{\text{C}}\text{H}_3$
- Q.42** Both the species of which of the following pairs do not exhibit electrophilic behaviour
- [1] $\text{H}_3\overset{\oplus}{\text{O}}, \overset{\oplus}{\text{N}}\text{H}_4$ [2] $\text{BF}_3, \overset{\oplus}{\text{C}}\text{I}$ [3] $\text{AlCl}_3, \text{SO}_3$ [4] $\text{RNH}_2, \overset{\oplus}{\text{C}}\text{H}_3$
- Q.43** The reaction of Grignard reagent on formaldehyde substrate is of the following type
- [1] Nucleophilic addition [2] Electrophilic addition
[3] Electrophilic substitution [4] Free radical substitution
- Q.44** Which of the following mechanism is not possible for the reactions of chlorine on toluene under different condition
- [1] Free radical addition [2] Electrophilic addition
[3] Electrophilic substitution [4] Free radical substitution
- Q.45** Both the species of which of the following pairs cannot behave as electrophiles
- [1] Nitronium ion, bromonium ion [2] Sulphur trioxide, formyl cation
[3] Anilinium ion, hydroxonium ion [4] Ethyl carbocation, acetyl carbocation

Q.46 Which of the following is more stable alkene than the remaining three towards electrophilic addition

- [1] Ethylene [2] Methylethylene [3] trans β -butylene [4] cis β -butylene

Q.47 Which of the following is not properly matched

[1] $\text{CH}_3\text{CO}-\ddot{\text{N}}: \rightarrow \text{CH}_3\text{N}=\text{C}=\text{O}$ Hofmann bromide reaction

[2] $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3 \rightarrow \text{CH}_3-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_3$ Isomerisation

[3] $\text{CH}_3\text{CH}_2\text{CH}_2\overset{\oplus}{\text{C}}\text{H}_2 \rightarrow \text{CH}_3\overset{\oplus}{\text{C}}\text{H}\text{CH}_2\text{CH}_3$ H^{\oplus} Transfer

[4]  Intramolecular rearrangement

Q.48 Which of the following is the most appropriate reason for the boiling points of ethanoic acid and ethyl ethanoate being 118° and 77° , respectively

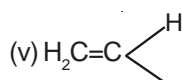
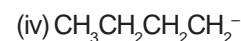
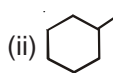
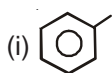
- [1] Difference in resonance stabilization [2] Difference in crystal lattice energy
 [3] Difference in molecular weight [4] Difference in intermolecular H-Bonding and ionization

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

Exercise # 3

- Q.1** Polarization of electrons in acrolein may be written as [I.I.T. 1988]
- [1] $\overset{\delta-}{\text{C}}\text{H}_2 = \text{CH} - \overset{\delta+}{\text{C}}\text{H} = \text{O}$ [2] $\overset{\delta-}{\text{C}}\text{H}_2 = \overset{\delta+}{\text{C}}\text{H} - \text{CH} = \text{O}$
- [3] $\overset{\delta-}{\text{C}}\text{H}_2 = \text{CH} - \text{CH} = \overset{\delta+}{\text{O}}$ [4] $\overset{\delta+}{\text{C}}\text{H}_2 = \text{CH} - \text{CH} = \overset{\delta-}{\text{O}}$
- Q.2** The number of sigma and pi bonds in 1-butene -3-yne are [I.I.T. 1989]
- [1] 5 sigma and 5 pi [2] 7 sigma and 3pi
- [3] 8 sigma and 2pi [4] 6 sigma and 4 pi
- Q.3** The compound in which C uses its sp^3 hybrid orbitals for bond formation is [I.I.T. 1989]
- [1] $\text{H} \overset{\cdot}{\text{C}} \text{OOH}$ [2] $(\text{H}_2\text{N})_2 \overset{\cdot}{\text{C}} \text{O}$ [3] $(\text{CH}_3)_3 \overset{\cdot}{\text{C}} \text{OH}$ [4] $\text{CH}_3 \overset{\cdot}{\text{C}} \text{HO}$
- Q.4** Indicate the correct statement [P.M.T.(MP) 1990]
- [1] $\text{C}_2\text{H}_5\text{NH}_3^+ \text{OH}^-$ is acidic [2] $\text{C}_2\text{H}_5\text{NH}_2$ is basic than NH_3
- [3] $\text{C}_2\text{H}_5\text{NH}_2$ is stronger base than ammonia [4] $\text{C}_2\text{H}_5\text{NH}_2$ form salt with bases
- Q.5** $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH} = \text{CH}_2$. The maximum number of linearly linked carbon atoms in the above compounds are [I.S.M. 1994]
- [1] 5 [2] 4 [3] 3 [4] 2
- Q.6** Most stable carbonium is [B.H.U. 1994]
- [1] $\text{CH}_3 - \text{CH}_2 - \overset{\oplus}{\text{C}}\text{H}_2$ [2] $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H} - \text{CH}_2 - \text{CH}_3$ [3] $\text{CH}_3 - \overset{\oplus}{\text{C}}(\text{CH}_3) - \text{CH}_3$ [4] $\text{CH}_3 - \overset{\oplus}{\text{C}}(\text{CH}_3)_2 - \text{CH}_2$
- Q.7** Which of the following statements is false about resonance contributing structures [C.B.S.E. 1994]
- [1] Contributing structures contribute to the resonance hybrid in proportion of their energies
- [2] Equivalent contributing structures make the resonance hybrid very stable
- [3] Contributing structures are less stable than the resonance hybrid
- [4] Contributing structures represent hypothetical molecules having no real existence
- Q.8** The carbon-carbon single bond distance in 1,2-dimethyl acetylene and ethane is 1.40\AA and 1.54\AA respectively. The shorter C-C bond distance of the former is best explained in terms of [I.C.S. Pr. 1994]
- [1] Inductive effect [2] Its acidic nature [3] Hyperconjugation [4] Hybridisation
- Q.9** In which of the compounds given below, there are carbon atoms having more than one type of hybridization (sp , sp^2 , sp^3) [C.B.S.E. 1995]
- (i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ (ii) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$ (iii) $\text{CH}_2 = \text{CH} - \text{CH} = \text{CH}_2$ (iv) $\text{H} - \text{C} \equiv \text{C} - \text{H}$
- [1] (ii) [2] (iii) and (iv) [3] (i) and (iv) [4] (ii) and (iii)

Q.10 Examine the following common chemical structures to which simple functional groups and often attached



Which of these systems have essentially planar geometry

[C.B.S.E. 1995]

[1] (iv)

[2] (i) and (v)

[3] (ii) and (iii)

[4] (i), (iii) and (iv)

Q.11 Which one of the following species is isoelectronic with ammonia

[I.C.S. Pr. 1995]

[1] CH_3Cl

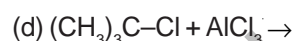
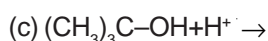
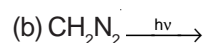
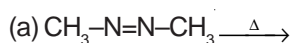
[2] CH_3^+

[3] CH_3^-

[4] $:\text{CH}_2$

Q.12 In the following reactions

[I.C.S. Pr. 1995]



The reactive intermediates formed would be

(a)

(b)

(c)

(d)

[1] CH_3^\bullet

$:\text{CH}_2$

$(\text{CH}_3)_3\text{C}^-$

$(\text{CH}_3)_3\text{C}^+$

[2] CH_3^-

CH_2^-

$(\text{CH}_3)_3\text{C}^\bullet$

$(\text{CH}_3)_3\text{C}^+$

[3] CH_3^\bullet

$:\text{CH}_2$

$(\text{CH}_3)_3\text{C}^+$

$(\text{CH}_3)_3\text{C}^+$

[4] CH_3^\bullet

$:\text{CH}_2$

$(\text{CH}_3)_3\text{C}^+$

$(\text{CH}_3)_3\text{C}^-$

Q.13 Which statement is correct

[R.A.S. Pr. 1995]

[1] Inductive effect is transmitted through pi-bonds

[2] Mesomeric effect is transmitted through pi-bonds

[3] Inductive effect is a field effect

[4] Mesomeric effect involves both sigma and pi-bonds

Q.14 Correct order of stability of carbocations is

[R.A.S. Pr. 1995]

[1] $\text{CH}_2=\text{CH}-\overset{+}{\text{C}}\text{H}_2 > \text{CH}_3-\overset{+}{\text{C}}\text{H}_2 > \text{C}_6\text{H}_5-\overset{+}{\text{C}}\text{H}_2 > (\text{CH}_3)_3\overset{+}{\text{C}}$

[2] $\text{C}_6\text{H}_5-\overset{+}{\text{C}}\text{H}_2 > \text{CH}_2=\overset{+}{\text{C}}\text{H}-\text{CH}_2 > (\text{CH}_3)_3\overset{+}{\text{C}} > \text{CH}_3-\overset{+}{\text{C}}\text{H}_2$

[3] $(\text{CH}_3)_3\overset{+}{\text{C}} > \text{CH}_3-\overset{+}{\text{C}}\text{H}_2 > \text{CH}_2=\text{CH}-\overset{+}{\text{C}}\text{H}_2 > \text{C}_6\text{H}_5-\overset{+}{\text{C}}\text{H}_2$

[4] $\text{C}_6\text{H}_5-\overset{+}{\text{C}}\text{H}_2 > \text{CH}_3-\overset{+}{\text{C}}\text{H}_2 > (\text{CH}_3)_3\overset{+}{\text{C}} > \text{CH}_2=\text{CH}-\overset{+}{\text{C}}\text{H}_2$

Q.15 An example of carbanion intermediate is

[R.A.S. Pr. 1995]

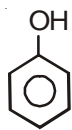
[1] Based catalysed halogenation of an aliphatic ketone [2] Nitration of benzene

[3] Addition of HZ at double bond

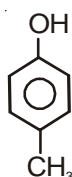
[4] Anti-Markownikoff's addition of HX across a double bond

Q.16 In the following compounds

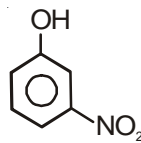
[I.I.T. 1996]



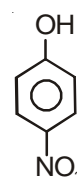
(i)



(ii)



(iii)



(iv)

The correct order of acid strength is

[1] III > IV > I > II

[2] I > IV > III > II

[3] II > I > III > IV

[4] IV > III > I > II

Q.17 Pair of groups exerting (-I) effect is

[R.A.S. Pr. 1996]

[1] -NO₂ and -CH₃

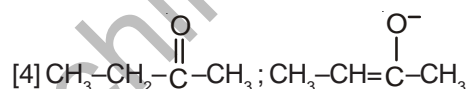
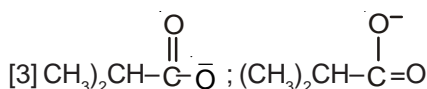
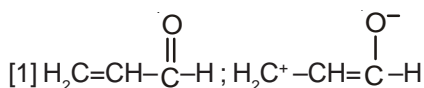
[2] -NO₂ and -Cl

[3] -Cl and -CH₃

[4] -CH₃ and -C₂H₅

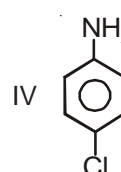
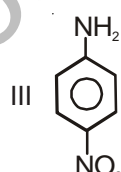
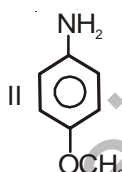
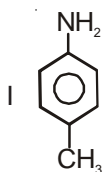
Q.18 Which of the following pairs represent the phenomenon of resonance

[I.C.S. Pr. 1997]



Q.19 The basic character of substituted anilines (I to IV) are such that

[I.C.S. Pre 1997]



[1] I < II < IV < III

[2] I < II < III < IV

[3] II < I < III < IV

[4] III < IV < I < II

Q.20 The order of ease of leaving group would be

[I.I.T. 1997]

-OAc

-OMe

-OSO₂Me

-OSO₂CF₃

I

II

III

IV

[1] I > II > III > V

[2] IV > III > I > II

[3] III > II > I > IV

[4] II > III > IV > I

Q.21 n-Butyl bromide is converted into isobutyl bromide by heating the compound with anhydrous AlCl₃. The intermediate formed in the isomeric change is

[I.C.S. Pr. 1997]

[1] Primary butyl carbocation

[2] Secondary butyl carbocation

[3] Primary and secondary butyl carbocation

[4] Secondary butyl free radical

Q.22 The true order of [-I] effect is

[C.B.S.E. 1998]

[1] -N⁺R₃ > OR > F

[2] F > -N⁺R₃ > -OR

[3] -N⁺R₃ > F > OR

[4] OR > -N⁺R₃ > F

Q.23 Which of the following compound on reaction with acetone gives the product containing >C=N- grouping

[1] C₆H₅NH₂

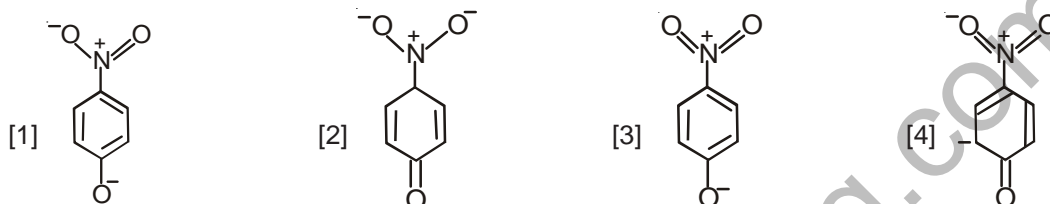
[2] (CH₃)₃N

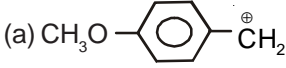
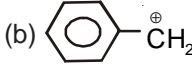

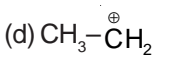
[I.I.I. 1998]

[3] C₆H₅NHC₆H₅

[4] C₆H₅NHNH₂

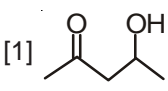
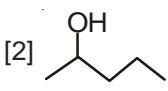
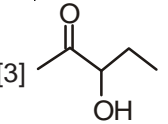
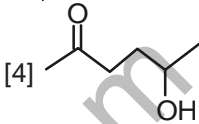
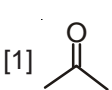
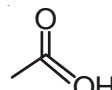
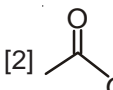
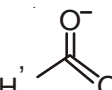

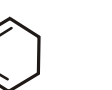
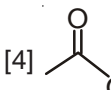
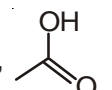
- Q.24** Which of the following reactions is not usually stereospecific [R.A.S. 1998]
 [1] S_N1 [2] Free radical substitution
 [3] E2 [4] Hydrogenation with H_2/Ni
- Q.25** Electrophile is : [B.H.U. 1998]
 [1] H_2O [2] NH_3 [3] $AlCl_3$ [4] $C_2H_5NH_2$
- Q.26** Heterolytic fission of an organic covalent bond gives only [MP.P.M.T. 1998]
 [1] Free radicals [2] Both cation and anion [3] Only cation [4] Only anion
- Q.27** The most unlikely representation of resonance structures of p-nitrophenoxide ion is [I.I.T. 1999]

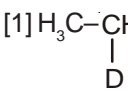
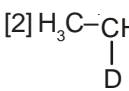
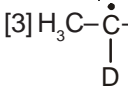
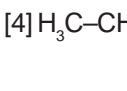


- Q.28** A solution of (+) 2-chloro-2-phenyl ethane in toluene racemises slowly in presence of small amount of $SbCl_5$ due to the formation of [I.I.T. 1999]
 [1] Carbanion [2] Carbene [3] Free radical [4] Carbocation
- Q.29** Which of the following has the most acidic proton [Roorkee Pr. 1998]
 [1] CH_3COCH_3 [2] $(CH_3)_2C=CH_2$ [3] $CH_3COCH_2COCH_3$ [4] $(CH_3CO)_3CH$
- Q.30** Which one of the following (C-H) bonds is the weakest for homolytic fission [I.C.S.Pr. 1999]
 [1] C_6H_5-H [2] C_6H_5CH-H [3] CH_3-H [4] $(C_6H_5)_3C-H$
- Q.31** Consider the following statements [I.C.S.Pr. 1999]
 (a) $CH_3O\overset{\oplus}{C}H_2$ is more stable than $CH_3\overset{\oplus}{C}H_2$ (b) $Me_2\overset{\oplus}{C}$ is more stable than $CH_3CH_2\overset{\oplus}{C}H_2$
 (c) $CH_2=CH-\overset{\oplus}{C}H_2$ is more stable than $CH_3CH_2\overset{\oplus}{C}H_2$ (d) $CH_2=\overset{\oplus}{C}H$ is more stable than $CH_3\overset{\oplus}{C}H$
- of these statements
 [1] a and b are correct [2] c and d are correct
 [3] a, b, and c are correct [4] b, c and d are correct
- Q.32** Consider the following carbocations [I.C.S.Pr. 1999]
- (a)  (b) 
- (c)  (d) 

The relative stabilities of these carbocations are such that

- [1] $d < b < c < a$ [2] $b < d < c < a$ [3] $d < b < a < c$ [4] $b < d < a < c$

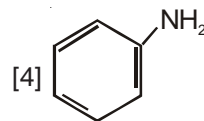
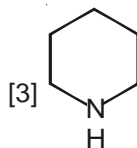
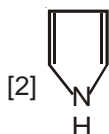
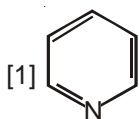
- Q.33** Consider the following compounds [I.C.S. Pr. 1999]
 (a) CH_2N_2 (b) $\text{CH}_2=\text{C}=\text{O}$ (c) CH_2I_2
 Those compounds which would generate carbene on exposure to ultraviolet light include
 [1] a, b and c [2] a and c [3] a and b [4] b and c
- Q.34** Carbon atom in the compound $(\text{CN})_4\text{C}_2$ are - [Roorkee Scr. 1999]
 [1] sp -Hybridised [2] sp^2 -Hybridised [3] sp and sp^2 Hybridised [4] sp , sp^2 and sp^3 hybridised
- Q.35** In which of the following, dehydration under acidic condition is easiest : [I.I.T. Screening 2000]
- [1]  [2]  [3]  [4] 
- Q.36** Among the following, the strongest base is [I.I.T. Screening 2000]
 [1] $\text{C}_6\text{H}_5\text{NH}_2$ [2] $p\text{-NO}_2\text{-C}_6\text{H}_4\text{NH}_2$ [3] $m\text{-NO}_2\text{-C}_6\text{H}_4\text{NH}_2$ [4] $\text{C}_6\text{H}_5\text{CH}_2\text{NH}_2$
- Q.37** Which of the following has the highest nucleophilicity ? [I.I.T. Screening 2000]
 [1] F^- [2] OH^- [3] CH_3^- [4] NH_2^-
- Q.38** Which of the following pairs are resonating structures with respect to one another [RPMT 2001]
- [1]  ,  [2]  ,  [3]  ,  [4]  , 
- Q.39** Consider the following reaction [I.I.T. Scr. 2002]

$$\text{H}_3\text{C}-\underset{\text{D}}{\text{CH}}-\underset{\text{CH}_3}{\text{CH}}-\text{CH}_3 + \dot{\text{B}}\text{r} \rightarrow \text{X} + \text{HBr}$$
 Identify the structure of the major product X
- [1]  [2]  [3]  [4] 
- Q.40** Which of the following is a pair of nucleophiles [R.P.E.T. 2002]
 [1] Br^- , BF_3 [2] $\text{C}_2\text{H}_5\text{S}^-$, >N [3] ZnCl_2 , CH_3^\oplus [4] RMgX , Cl^\oplus
- Q.41** How many π -bonds are present in naphthalene [R.P.M.T. 2002]
 [1] Five [2] Two [3] Six [4] Four
- Q.42** The most reactive nucleophile is : [AIIMS 2003]
 [1] CH_3O^- [2] $\text{C}_6\text{H}_5\text{O}^-$ [3] $(\text{CH}_3)_2\text{CHO}^-$ [4] $(\text{CH}_3)_3\text{CO}^-$
- Q.43** Rate of the reaction $\text{R}-\text{C} \begin{matrix} \text{O} \\ \parallel \\ \text{Z} \end{matrix} + \text{Nu}^- \longrightarrow \text{R}-\text{C} \begin{matrix} \text{O} \\ \parallel \\ \text{Nu} \end{matrix} + \text{Z}^-$ is fastest when Z is [AIEEE 2004]
 [1] OCOCH_3 [2] NH_2 [3] OC_2H_5 [4] Cl

Q.44 Which one of the following does not have sp^2 hybridised carbon [AIIEE 2004]

- [1] Acetamide [2] Acetic acid [3] Acetonitrile [4] Acetone

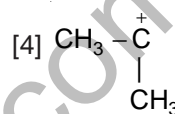
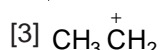
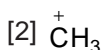
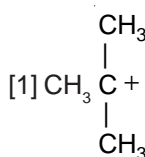
Q.45 The strongest base among the following is - [AIIMS-2004]



Q.46 The compound having only primary hydrogen atoms is - [AIIMS-2004]

- [1] Isobutene [2] 2, 3-Dimethylbutene [3] Cyclohexane [4] Propene

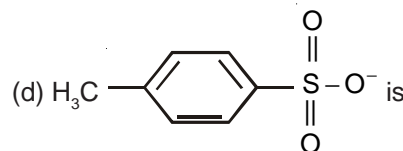
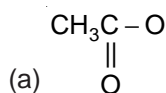
Q.47 Which amongst the following is the most stable carbocation - [CPMT-2005]



Q.45 Due to the presence of an unpaired electron, free radicals are - [AIIEE-2005]

- (1) Chemically inactive [2] Chemically reactive [3] Cations [4] Anions

Q.49 The decreasing order of nucleophilicity among the nucleophiles [AIIEE-2005]



- [1] (d), (c), (b), (a) [2] (a), (b), (c), (d) [3] (c), (b), (a), (d) [4] (b), (c), (a), (d)

Q.50 Tertiary alkyl halides are practically inert to substitution by S_N2 mechanism because of [AIIEE-2005]

- [1] instability [2] insolubility [3] steric hindrance [4] inductive effect

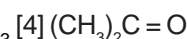
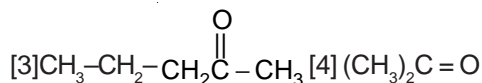
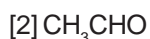
Q.51 The reaction $\text{R}-\text{C}(=\text{O}) + \text{Nu}^- \rightarrow \text{R}-\text{C}(\text{O}^-)(\text{Nu}) + \text{X}^-$ is fastest when X is [AIIEE-2005]



Q.52 Which of the following is more basic than aniline? [CPMT-2006]

- [1] p-Nitroaniline [2] Benzylamine [3] Diphenylamine [4] Triphenylamine

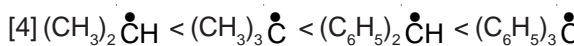
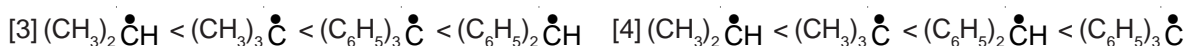
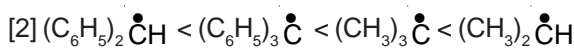
Q.53 Nucleophilic addition reaction will be most favoured in [CPMT-2006]



Q.54 The increasing order of the rate of HCN addition to compounds A – D is [AIIEE-2006]

- (A) HCHO (B) CH_3COCH_3 (C) PhCOCH_3 (D) PhCOPh
 [1] $\text{D} < \text{B} < \text{C} < \text{A}$ [2] $\text{D} < \text{C} < \text{B} < \text{A}$ [3] $\text{C} < \text{D} < \text{B} < \text{A}$ [4] $\text{A} < \text{B} < \text{C} < \text{D}$

Q.55 The increasing order of stability of the following free radicals is - [AIIEE-2006]





The decreasing order of the rate of the above reaction with nucleophiles (Nu^-) A to D is -

$[\text{Nu}^- = (\text{A}) \text{PhO}^-, (\text{B}) \text{AcO}^-, (\text{C}) \text{HO}^-, (\text{D}) \text{CH}_3\text{O}^-]$

[AIEEE-2006]

[1] $\text{D} > \text{C} > \text{B} > \text{A}$

[2] $\text{A} > \text{B} > \text{C} > \text{D}$

[3] $\text{B} > \text{D} > \text{C} > \text{A}$

[4] $\text{D} > \text{C} > \text{A} > \text{B}$

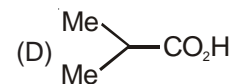
Q.57 The correct order of increasing acid strength of the compounds

[AIEEE-2006]

(A) $\text{CH}_3\text{CO}_2\text{H}$

(B) $\text{MeOCH}_2\text{CO}_2\text{H}$

(C) $\text{CF}_3\text{CO}_2\text{H}$

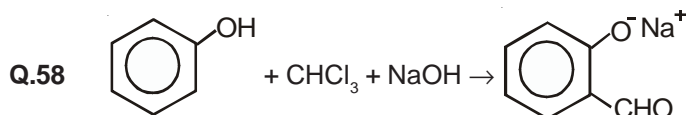


[1] $\text{D} < \text{A} < \text{C} < \text{B}$

[2] $\text{D} < \text{A} < \text{B} < \text{C}$

[3] $\text{A} < \text{D} < \text{C} < \text{B}$

[4] $\text{B} < \text{D} < \text{A} < \text{C}$



The electrophile involved in the above reaction is

[AIEEE - 2006]

[1] Dichlorocarbene ($:\text{CCl}_2$)

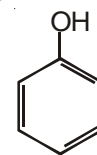
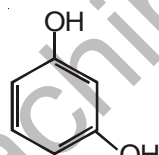
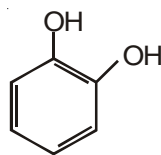
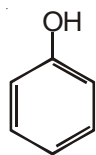
[2] Trichloromethyl anion (CCl_3^-)

[3] Formyl cation (CHO^+)

[4] Dichloromethyl cation (CHCl_2^+)

Q.59 Arrange the boiling point of

[IIT - 2006]



(I)

(II)

(III)

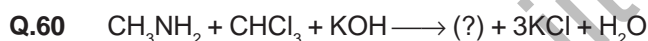
(IV)

[1] $\text{IV} < \text{I} < \text{III} < \text{II}$

[2] $\text{II} < \text{III} < \text{I} < \text{IV}$

[3] $\text{IV} < \text{I} < \text{II} < \text{III}$

[4] $\text{I} < \text{IV} < \text{III} < \text{II}$



The missing product is

[IIT - 2006]

[1] CH_3CN

[2] $\text{CH}_3\text{N}^+\equiv\text{C}^-$

[3] $\text{CH}_3\text{N}^-\equiv\text{C}^+$

[4] CH_3NHCl

Q.61 Which of the following is the correct order of decreasing $\text{S}_\text{N}2$ reactivity ?

[1] $\text{R}_3\text{CX} > \text{R}_2\text{CHX} > \text{RCH}_2\text{X}$

[2] $\text{R}_2\text{CHX} > \text{R}_3\text{CX} > \text{RCH}_2\text{X}$

[3] $\text{RCH}_2\text{X} > \text{R}_3\text{CX} > \text{R}_2\text{CHX}$

[4] $\text{RCH}_2\text{X} > \text{R}_2\text{CHX} > \text{R}_3\text{CX}$

(X = a halogen)

[AIEEE- 2007]

Q.62 Which one of the following is the strongest base in aqueous solution?

[1] Dimethylamine

[2] Methylamine

[3] Trimethylamine

[4] Aniline

[AIEEE- 2007]

Answer Key

Qus.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	4	2	3	3	2	3	4	4	1	2	3	3	2	2	1	4	2	2	4	2
Qus.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	3	3	4	4	3	2	3	4	4	4	3	1	3	3	1	4	3	2	2	2
Qus.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	1	1	4	3	3	1	1	2	4	3	2	2	2	2	3	4	2	1	2	2
Qus.	61	62																		
Ans.	4	1																		