14. General Organic Chemistry – Multiple Choice Questions

1. Bonding and Hybridisation in Organic Compounds

1. Each carbon atom in benzene is in the state of hybridization

(a) sp^3 (b) sp^2

(c) sp (d) s^3p

2. Which is an acidic hydrocarbon

(a) $CH_3CH_2CH_2CH_3$ (b) $CH_3C \equiv CCH_3$

(c) $CH_3C \equiv CH$ (d) $CH_2 = CH - CH = CH_2$

3. Hybridisation in $\overset{+}{C}H_3$ and $\overset{-}{C}H_3$ are

(a) sp and sp^2 respectively

(b) sp^2 and sp^2 respectively

(c) sp^2 and sp^3 respectively

(d) sp^3 and sp^3 respectively

4. Graphite is soft while diamond is hard because

(a) Graphite is in powder form

(b) Diamond has sp^2 hybridization but graphite has sp^3 hybridization

(c) Graphite is in planar form while diamond is in tetrahedral form

(d) Graphite is covalent and diamond is ionic

5. The shapes of methane, ethene and ethyne molecules are, respectively

(a) Tetrahedral, planar and linear

(b) Tetrahedral, linear and planar

(c) Pyramidal, planar and linear

(d) Tetrahedral, pyramidal and planar

6. In ethane, ethene and ethyne molecules, carbon atoms are present in hybrid states of

(a) $sp^3 - sp^2, sp^2 - sp^2, sp^2 - sp$

(b) $sp^3 - sp, sp^3 - sp^2, sp^3 - sp$

(c) $sp^3 - sp^3, sp^2 - sp^2, sp - sp$

(d) $sp^2 - sp^3, sp^2 - sp, sp^2 - sp^3$

7. Which of the following intermediate have the complete octet around the carbon atom

(a) Carbonium ion (b) Carbanion ion

(c) Free radical (d) Carbene

8. Which of the following solvents are aprotic

(1) NH_3 (2) SO_2

(3) CH_3CN (4) CH_3CO_2H

(a) 1, 2, 3 (b) 1, 3, 4

(c) 2, 3 (d) 1, 3

9. Choose the correct order arranged in decreasing order of basicity

(a) $CH \equiv C^- > CH_3O^- > OH^-$

(b) $OH^- > CH_3O^- > CH \equiv C^-$

(c) $CH_3O^- > OH^- > CH \equiv C^-$

(d) $CH_3O^- > CH \equiv C^- > OH^-$

10. Electronegativity of carbon atoms depends upon their state of hybridisation. In which of the following compounds, the carbon marked with asterisk is most electronegative

(a) $CH_3 - CH_2 - {}^*CH_2 - CH_3$

(b) $CH_3 - {}^*CH = CH - CH_3$

(c) $CH_3 - CH_2 - C \equiv {}^*CH$

(d) $CH_3 - CH_2 - CH = {}^*CH_2$

11. Number of π electrons present in naphthalene is

(a) 4 (b) 6

(c) 10 (d) 14

12. Carbon atoms in the compound $(CN)_4C_2$ are

(a) sp hybridized

(b) sp^2 hybridized

(c) sp and sp^2 hybridized

(d) sp, sp^2 and sp^3 hybridized

13. Number of unhybridised orbitals in vinyl acetylene are

(a) 2 (b) 3

(c) 4 (d) 6

14. Which one of the following is more acidic

(a) Butane (b) 1-butene

(c) 1-butyne (d) 2-butyne

15. Cyclic hydrocarbon molecule 'A' has all the carbon and hydrogen in a single plane. All the carbon-carbon bonds are of same length less than 1.54Å, but more than 1.34Å. The $C-C$ bond angle will be

(a) 109°28′ (b) 100°

(c) 180° (d) 120°

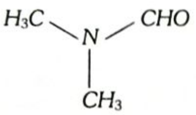
16. The hybridisation state of carbon in fullerene is

(a) sp (b) sp^2

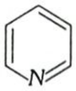
(c) sp^3 (d) sp^3d

17. The compounds containing sp hybridized carbon atom are

(i)



(ii)



(iii) H_3C-CN (iv) $H_2C=C=CHCH_3$

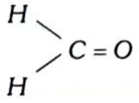
(a) (i) and (ii) (b) (iii) and (iv)

(c) (ii) and (iii) (d) (i) and (iv)

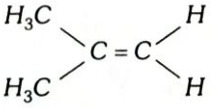
2. Dipole Moment, Resonance and Reaction Intermediates

1. Which has highest dipole moment

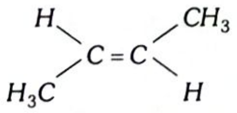
(a)



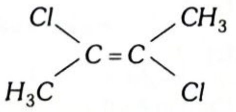
(b)



(c)



(d)



2. Polarisation of electrons in acrolein may be written as

(a) $CH_2^{\delta-}=CH-CH^{\delta+}=O$

(b) $CH_2^{\delta-}=CH-CH=O^{\delta+}$

(c) $CH_2^{\delta-}=CH^{\delta+}-CH=O$

(d) $CH_2^{\delta+}=CH-CH=O^{\delta-}$

3. The temporary effect in which there is complete transfer of a shared pair of pi-electrons to one of the atoms joined by a multiple bond on the demand of an attacking reagent is called

(a) Inductive effect

(b) Positive resonance effect

(c) Negative resonance effect

(d) Hyperconjugation

(e) Electromeric effect

4. Benzene is unreactive because

(a) It has double bonds

(b) It has carbon-carbon single bond

(c) Carbon are sp^2 hybridised

(d) π electrons are delocalised

5. '$C-C$' bond length in benzene lies between single and double bond. The reason is

(a) Resonance (b) Isomerism

(c) Metamerism (d) Inductive effect

6. Orbital interaction between the sigma bonds of a substituent group and a neighbouring *pi* orbital is known as

(a) Hyperconjugation

(b) Inductive effect

(c) Steric effect

(d) Dipole-dipole interactions

(e) Electric quadruple interactions

7. Which is the most stable carbocation

(a) Iso-propyl (b) Triphenylmethyl cation

(c) Ethyl cation (d) π -propyl cation

8. Relative stabilities of the following carbocations will be in the order

$\overset{\oplus}{C}H_3$ (i) $CH_3\overset{\oplus}{C}H_2$ (ii) $\overset{\oplus}{C}H_2OCH_3$ (iii)

(a) (iii) > (ii) > (i) (b) (iii) < (ii) < (i)

(c) (ii) > (iii) > (i) (d) (iii) > (i) > (ii)

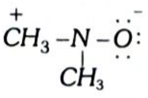
9. Chloroacetic acid is a stronger acid than acetic acid. This can be explained using

(a) $-M$ effect (b) $-I$ effect

(c) $+M$ effect (d) $+I$ effect

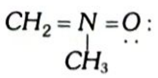
10. Among the following structures, which is not permissible resonance form

(a)



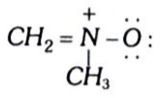
$\overset{+}{C}H_3-\underset{CH_3}{N}-\overset{..}{\underset{..}{O}}\overset{-}{:}$

(b)



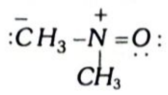
$CH_2=\underset{CH_3}{N}=\underset{..}{O}:$

(c)



$CH_2=\overset{+}{\underset{CH_3}{N}}-\overset{..}{\underset{..}{O}}:$

(d)



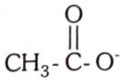
$:\overset{-}{C}H_3-\overset{+}{\underset{CH_3}{N}}=\underset{..}{O}:$

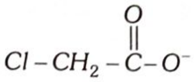
11. In which of the following compounds the carbon marked with asterisk is expected to have greatest positive charge

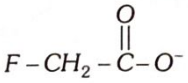
(a) $^{*}CH_3-CH_2-Cl$ (b) $^{*}CH_3-CH_2-Mg^{+}Cl^{-}$

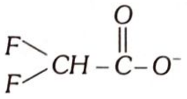
(c) $^{*}CH_3-CH_2-Br$ (d) $^{*}CH_3-CH_2-CH_3$

12. Ionic species are stabilised by the dispersal of charge. Which of the following carboxylate ion is the most stable

(a) 
$CH_3-\overset{\overset{O}{\|}}{C}-O^{-}$

(b) 
$Cl-CH_2-\overset{\overset{O}{\|}}{C}-O^{-}$

(c) 
$F-CH_2-\overset{\overset{O}{\|}}{C}-O^{-}$

(d) 

13. Strongest acid is

(a) $HC\equiv CH$ (b) C_2H_6

(c) C_6H_6 (d) CH_3OH

14. Aromatic properties of benzene are proved by

(a) Aromatic sextet theory (b) Resonance theory

(c) Molecular orbital theory (d) All of these

15. Carboxylic acids are easily ionised. The main reason of this statement

(a) Absence of α-hydrogen

(b) Resonance stabilisation of carboxylate ion

(c) Reactivity of α-hydrogen

(d) Hydrogen bond

16. Which among following statements are true with respect to electronic displacement in a covalent bond

(1) Inductive effect operates through π bond

(2) Resonance effect operates through σ bond

(3) Inductive effect operates through σ bond

(4) Resonance effect operate through π bond

(5) Resonance and Inductive effect operate through σ bond

(a) 3 and 4 (b) 1 and 2

(c) 2 and 4 (d) 1 and 3

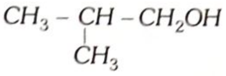
(e) 2 and 3

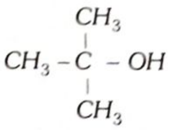
17. Which of the following is the most stable compound

(a) $Ph_3\overset{+}{C}$ (b) $Ph_2\overset{+}{C}H$

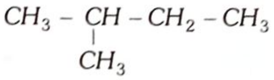
(c) $Ph_3C\overset{+}{C}H_2$ (d) $Ph\overset{+}{C}H_2$

18. The compound, which gives the most stable carbonium ion on dehydrogenation

(a) 
$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2OH$

(b) 
$CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-OH$

(c) $CH_3-CH_2-CH_2-CH_2OH$

(d) 
$CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-CH_3$

19. The stability of $Me_2C=CH_2$ is more than that of $MeCH_2CH=CH_2$ due to

(a) Inductive effect of the *Me* group

(b) Resonance effect of the *Me* group

(c) Hyperconjugative effect of the *Me* group

(d) Resonance as well as inductive effect of the *Me* group

20. The descending order of stability of the carbonium ions

$$\underset{(I)}{C_6H_5\overset{+}{C}H_2}, \underset{(II)}{p-(CH_3O)C_6H_4\overset{+}{C}H_2}, \underset{(III)}{p-(NO_2)C_6H_4\overset{+}{C}H_2}$$

and $\underset{(IV)}{p-(CH_3)C_6H_4\overset{+}{C}H_2}$ is

(a) IV > II > I > III (b) II > IV > III > I

(c) II > IV > I > III (d) IV > II > III > I

21. Among the following, which is least acidic

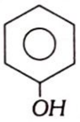
(a) *p*–nitrophenol (b) *p*–chlorophenol

(c) Phenol (d) *o*–cresol

22. Given

(i) 

(ii) 

(iii) 

The decreasing order of the acidic character is

(a) (i) > (ii) > (iii) (b) (ii) > (i) > (iii)

(c) (ii) > (iii) > (i) (d) (iii) > (ii) > (i)

23. What is the correct order of decreasing stability of the following cations

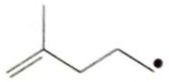
$$\underset{I}{CH_3-\overset{\oplus}{C}H-CH_3} \quad \underset{II}{CH_3-\overset{\oplus}{C}H-OCH_3}$$

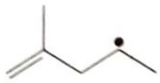
$$\underset{III}{CH_3-\overset{\oplus}{C}H-CH_2-OCH_3}$$

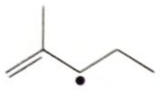
(a) $II > I > III$ (b) $II > III > I$

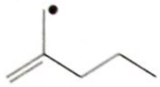
(c) $III > I > II$ (d) $I > II > III$

24. Which of the following free radicals is most stable

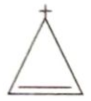
(a) 

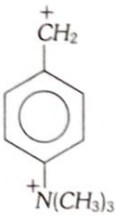
(b) 

(c) 

(d) 

25. What will be the decreasing order of stability of following carbocations


(1)


(2)


(3)


(4)

$HC \equiv \overset{+}{C}$
(5)

(a) 3 > 5 > 4 > 1 > 2 (b) 1 > 2 > 3 > 5 > 4

(c) 5 > 4 > 3 > 2 > 1 (d) 1 > 2 > 3 > 4 > 5

26. Which kind of fission is favoured by sunlight

(a) Heterolytic fission (b) Homolytic fission

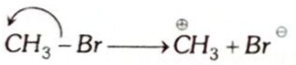
(c) Both (a) and (b) (d) None of these

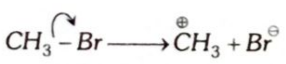
27. Strongest nucleophile is

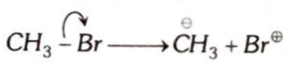
(a) RNH_2 (b) ROH

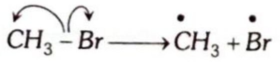
(c) $C_6H_5O^-$ (d) CH_3O^-

28. Covalent bond can undergo fission in two different ways. The correct representation involving a heterolytic fission of $CH_3 - Br$ is

(a) 
$CH_3 - Br \longrightarrow \overset{\oplus}{C}H_3 + Br^{\ominus}$

(b) 
$CH_3 - Br \longrightarrow \overset{\oplus}{C}H_3 + Br^{\ominus}$

(c) 
$CH_3 - Br \longrightarrow \overset{\ominus}{C}H_3 + Br^{\oplus}$

(d) 
$CH_3 - Br \longrightarrow \overset{\bullet}{C}H_3 + \overset{\bullet}{B}r$

29. Which of the following compounds are not arranged in order of decreasing reactivity towards electrophilic substitution

(a) Fluoro benzene > chloro benzene > bromo benzene

(b) Phenol > *n*-propyl benzene > benzoic acid

(c) Chloro toluene > para-nitro toluene > 2-chloro-4-nitro toluene

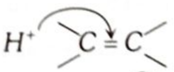
(d) Benzoic acid > phenol > *n*-propyl benzene

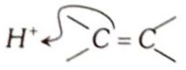
30. Electrophilic addition reactions proceed in two steps. The first step involves the addition of an electrophile. Name the type of intermediate formed in the first step of the following addition reaction. $H_3C - HC = CH_2 + H^+ \longrightarrow$

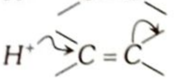
(a) 2° carbanion (b) 1° carbocation

(c) 2° carbocation (d) 1° carbanion

31. The addition of HCl to an alkene proceeds in two steps. The first step is the attack of H^+ ion to $>C = C<$ portion which can be shown as

(a) 

(b) 

(c) 

(d) All of these are possible

32. The correct order for homolytic bond dissociation energies (ΔH in *kcal/mol*) for $CH_4(A)$, $C_2H_6(B)$ and $CH_3Br(C)$ is

(a) $C > B > A$ (b) $B > A > C$

(c) $C > A > B$ (d) $A > B > C$

33. The reaction of methyltrichloroacetate (Cl_3CCO_2Me) with sodium methoxide ($NaOMe$) generates

(a) Carbocation (b) Carbene

(c) Carbanion (d) Carbon radical

34. Which of the following compound possesses the "C – H" bond with the lowest bond dissociation energy

(a) n-pentane (b) Toluene

(c) 2, 2 – dimethyl propane (d) Benzene

3. Organic Reactions and their Mechanism

1. Following reaction, $(CH_3)_3CBr + H_2O \rightarrow (CH_3)_3COH + HBr$ is an example of

(a) Elimination reaction (b) Free radical substitution

(c) Nucleophilic substitution (d) Electrophilic substitution

2. Which of the following applies in the reaction

$CH_3CHBrCH_2CH_3 \xrightarrow{alc.\ KOH}$

(i) $CH_3CH = CHCH_3$ (major product)

(ii) $CH_2 = CHCH_2CH_3$ (minor product)

(a) Markonikoff's rule (b) Saytzeff's rule

(c) Kharasch effect (d) Hofmann's rule

3. $CH_3Br + OH \longrightarrow CH_3OH + Br$, this reaction proceeds by S_{N^2} – mechanism. Its rate is dependent on the concentration of

(a) CH_3Br, OH (b) CH_3Br only

(c) OH only (d) CH_3Br, CH_3OH

4. Which of the following is not true for S_{N^1} reaction

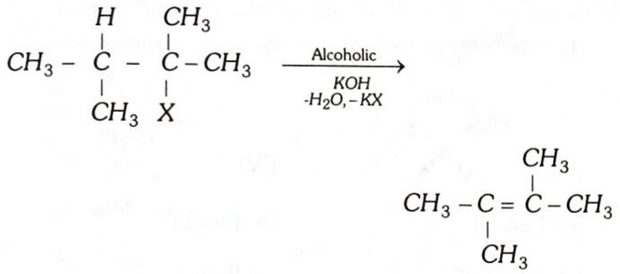
(a) Favoured by polar solvents

(b) 3°-alkyl halides generally react through S_{N^1} reaction

(c) The rate of the reaction does not depend upon the molar concentration of the nucleophile

(d) 1°-alkyl halides generally react through S_{N^1} reaction

5. The following reaction



$$CH_3-\underset{CH_3}{\overset{H}{C}}-\underset{X}{\overset{CH_3}{C}}-CH_3 \xrightarrow[\text{-}H_2O,-KX]{\text{Alcoholic } KOH} CH_3-\underset{CH_3}{C}=\overset{CH_3}{C}-CH_3$$

is an example of

(a) α – elimination (b) β – elimination

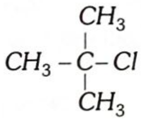
(c) Hofmann elimination (d) None of these

6. S_{N^1} reaction is faster in

(a) CH_3CH_2Cl

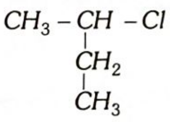
(b) $\begin{matrix}CH_3\\CH_3\end{matrix}\!>CH-Cl$

(c)



$CH_3-\underset{CH_3}{\overset{CH_3}{C}}-Cl$

(d)



$CH_3-\underset{\underset{CH_3}{CH_2}}{CH}-Cl$

7. To which of the following four types does this reaction belong $B^-+R-A\to B-R+A^-$

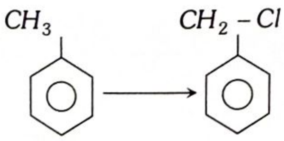
(a) Unimolecular electrophilic substitution

(b) Bimolecular electrophilic substitution

(c) Unimolecular nucleophilic substitution

(d) Bimolecular nucleophilic substitution

8.



The above reaction proceeds through

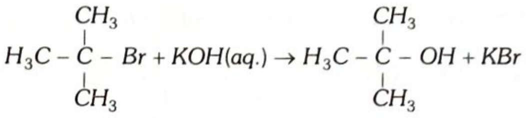
(a) Nucleophilic substitution

(b) Electrophilic substitution

(c) Free radical substitution

(d) More than one of the above processes

9.



$$H_3C-\underset{CH_3}{\overset{CH_3}{C}}-Br+KOH(aq.)\to H_3C-\underset{CH_3}{\overset{CH_3}{C}}-OH+KBr$$

above reaction is

(a) S_{N^1} (b) S_{N^2}

(c) E_1 (d) Both (a) and (b)

10. The most common type of reaction in aromatic compounds is

(a) Elimination reaction

(b) Addition reaction

(c) Electrophilic substitution reaction

(d) Rearrangement reaction

11. Addition of HCl to vinyl chloride gives 1, 1-dichloroethane because of

(a) Mesomeric effect of Cl

(b) Inductive effect of Cl

(c) Restricted rotation around double bond

(d) None of these

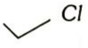
12. The following compound will undergo electrophilic substitution more readily than benzene

(a) Nitrobenzene (b) Benzoic acid

(c) Benzaldehyde (d) Phenol

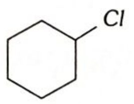
13. Which one of the following species will be most reactive in S_{N^2} reaction

(a)

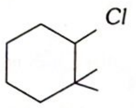


(b)

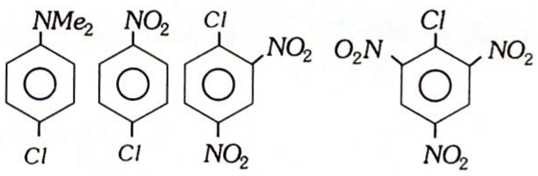
(c)



(d)



14. Order of reactivity towards nucleophilic substitution reaction of the compounds

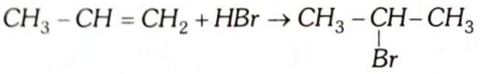


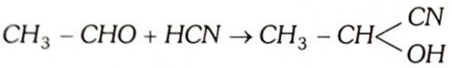
(i) (ii) (iii) (iv)

(a) (i) > (ii) > (iii) > (iv) (b) (ii) > (i) > (iii) > (iv)

(c) (iv) > (iii) > (ii) > (i) (d) (iii) > (iv) > (ii) > (i)

15. Which of the following requires radical intermediate

(a) 
$CH_3-CH=CH_2+HBr\rightarrow CH_3-\underset{\displaystyle Br}{\underset{|}{C}H}-CH_3$

(b) 
$CH_3-CHO+HCN\rightarrow CH_3-CH\begin{matrix}CN\\OH\end{matrix}$

(c) $CH_3-CH=CH_2+HBr\rightarrow CH_3-CH_2-CH_2-Br$

(d) $CH_3CHO+NH_2OH\xrightarrow{H^+}CH_3-CH=N-OH$

16. Which gives monosubstituted product

(a) o -dinitrobenzene
(b) m -dinitrobenzene
(c) p -dinitrobenzene
(d) Nitrobenzene

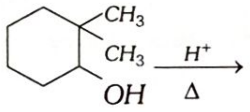
17. The species responsible for nitration is

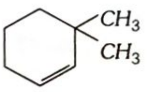
(a) NO_2^+
(b) NO_3
(c) NO_2
(d) All the above

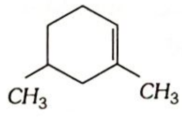
18. In electrophilic aromatic substitution reaction, the nitro group is meta directing because it

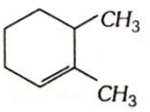
(a) Decreases electron density at meta position
(b) Increases electron density at meta position
(c) Increases electron density at ortho and *para* position
(d) Decreases electron density at ortho and para positions

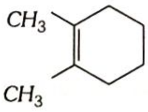
19. Find the product of the given reaction

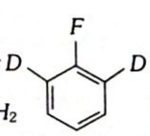


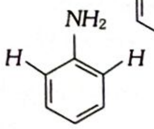
(a) 

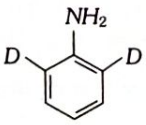
(b) 

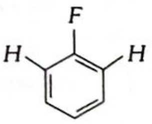
(c) 

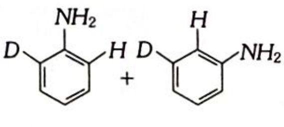
(d) 

20. Treatment of  with $NaNH_2\,/\,liq.\ NH_3$ gives

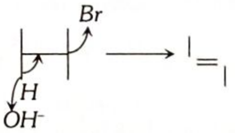
(a) 

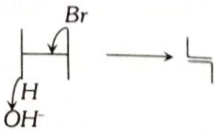
(b) 

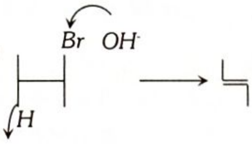
(c) 

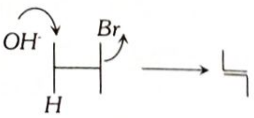
(d) 

21. Dehydrohalogenation in presence of OH^- is correctly represented by

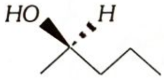
(a) 

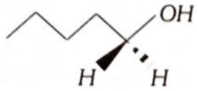
(b) 

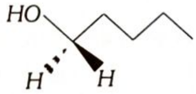
(c) 

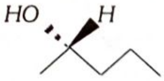
(d) 

22. The enantiomeric pair among the following four structures

(I) 

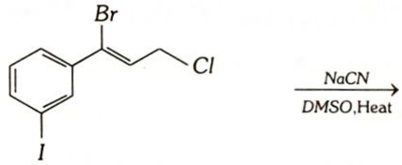
(II) 

(III) 

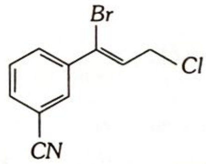
(IV) 

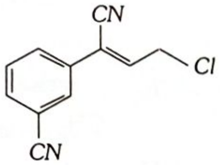
(a) I and II
(b) I and IV
(c) II and III
(d) II and IV

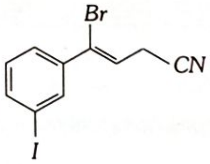
23. The major product formed in the reaction

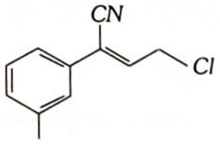


Product is

(i) 

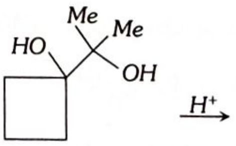
(ii) 

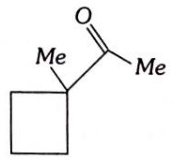
(iii) 

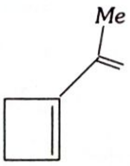
(iv) 

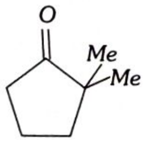
(a) (i)
(b) (ii)
(c) (iii)
(d) (iv)

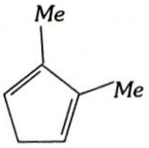
24. The major product of the following reaction is



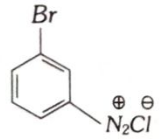
(a) 

(b) 

(c) 

(d) 

25. For the transformation

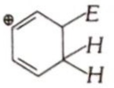


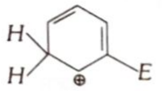
The reagent used is

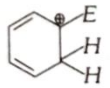
(a) $LiAlH_4$ (b) H_3PO_2

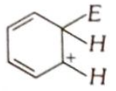
(c) H_3O^+ (d) H_2/Pt

26. In the reaction benzene with an electrophile E^+, the structure of the intermediate σ – complex can be represented as

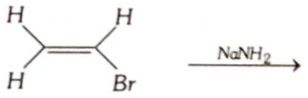
(a) 

(b) 

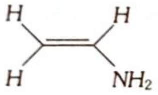
(c) 

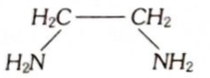
(d) 

27. The major product in the following reaction is



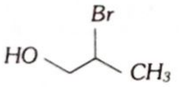
(a) $H-\equiv-H$

(b) 

(c) 

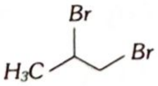
(d) 

28. The major product of the following reaction is

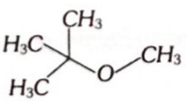
(a) 

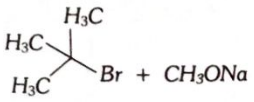
(b) 

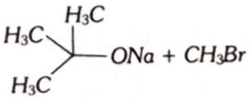
(c) 

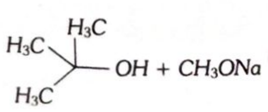
(d) 

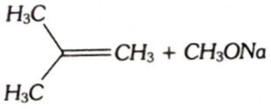
29. The reaction that gives the following molecule as the major product is



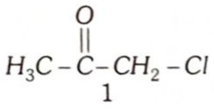
(a) 

(b) 

(c) 

(d) 

30. The order of S_{N^1} reactivity in aqueous acetic acid solution for the compounds



$\underset{1}{H_3C-\overset{\overset{O}{||}}{C}-CH_2-Cl}$ $\underset{2}{H_3C-CH_2-CH_2-Cl}$

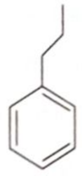
$\underset{3}{(H_3C)_3C-Cl}$

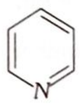
is

(a) $1>2>3$ (b) $1>3>2$

(c) $3>2>1$ (d) $3>1>2$

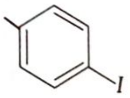
31. The species that exhibits the highest R_f value in a thin layer chromatogram using a nonpolar solvent on a silica gel plate is

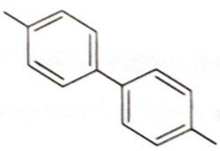
(a) 

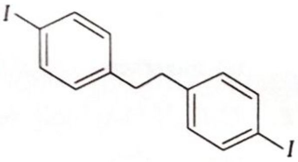
(b) 

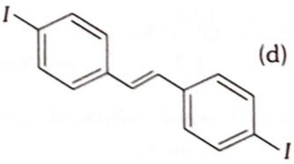
(c) 

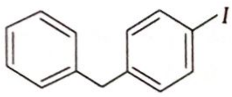
(d) 

32. The major product of the following reaction  $\xrightarrow{Cu,\Delta}$ is

(a) 

(b) 

(c) 

(d) 

33. The major product of the reaction between CH_3CH_2ONa and $(CH_3)_3CCl$ in ethanol is

(a) $CH_3CH_2OC(CH_3)_3$ (b) $CH_2=C(CH_3)_2$

(c) $CH_3CH_2C(CH_3)_3$ (d) $CH_3CH=CHCH_3$

34. The stability of carbocations

$\underset{I}{(CH_3)_3\overset{\oplus}{C}}$ $\underset{II}{(CH_3)_2\overset{\oplus}{C}(OCH_3)}$ $\underset{III}{CH_3CH_2CH_2\overset{\oplus}{C}H_2}$

$\underset{IV}{CH_3\overset{\oplus}{C}HCH_2CH_3}$

follows the order

(a) $III < IV < II < I$ (b) $III < IV < I < II$

(c) $IV < III < II < I$ (d) $IV < III < I < II$

35. In electrophilic aromatic substitution reactions of chlorobenzene, the ortho/para–directing ability of chlorine is due to its

(a) Positive inductive effects $(+I)$

(b) Negative inductive effect $(-I)$

(c) Positive resonance effect $(+R)$

(d) Negative resonance effect $(-R)$

4. Structural and Stereo Isomerism

1. The isomerism exhibited by alkyl cyanide and alkyl isocyanide is

(a) Functional (b) Positional

(c) Tautomerism (d) Metamerism

2. The total number of possible isomeric trimethyl benzene is

(a) 2 (b) 3

(c) 4 (d) 6

3. Dimethyl ether and ethyl alcohol are

(a) Metamers (b) Homologues

(c) Functional isomers (d) Position isomers

4. Diethyl ether and methyl *n*-propyl ether are

(a) Position isomers (b) Functional isomers

(c) Metamers (d) Chain isomers

5. C_7H_9N has how many isomeric forms that contain a benzene ring

(a) 4 (b) 5

(c) 6 (d) 7

6. Which isomer of hexane has only two different sets of structurally equivalent hydrogen atoms

(a) 2, 2-dimethylbutane (b) 2-methyl pentane

(c) 3-methylpentane (d) 2, 3-dimethylbutane

7. Nitroethane can exhibit one of the following kind of isomerism

(a) Metamerism (b) Optical activity

(c) Tautomerism (d) Position isomerism

8. Which of the following compounds will show metamerism

(a) $CH_3COOC_2H_5$ (b) $C_2H_5-S-C_2H_5$

(c) CH_3-O-CH_3 (d) $CH_3-O-C_2H_5$

9. How many primary amines are possible for the formula $C_4H_{11}N$

(a) 1 (b) 2

(c) 3 (d) 4

10. How many structural isomers are possible for $C_4H_{10}O$

(a) 3 (b) 4

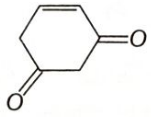
(c) 5 (d) 7

11. Which of the following does not exhibit tautomerism

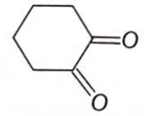
(a)

(b)

(c)



(d)

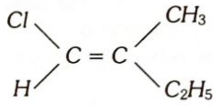


12. Which of the following compounds will show geometrical isomerism

(a) Cyclohexene (b) 2-hexene

(c) 3-hexyne (d) 1, 1-diphenylethylene

13. Compound



has the following prefix

(a) E (b) Z

(c) trans (d) Anti

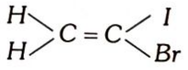
14. The number of geometrical isomers in case of a compound with the structure $CH_3-CH=CH-CH=CH-C_2H_5$ is

(a) 4 (b) 3

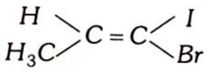
(c) 2 (d) 5

15. Which shows geometrical isomerism

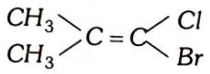
(a)



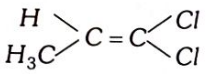
(b)



(c)



(d)



16. Which pair show cis-trans isomerism

(a) Maleic-fumaric acid (b) Lactic-tartaric acid

(c) Malonic-succinic acid (d) Crotonic-acrylic acid

17. Stereoisomers which are not the mirror images of one another are called

(a) Enantiomers (b) Mesomers

(c) Tautomers (d) Diasteroisomers

18. An organic compound

$$^1CH_3-{}^2CH_2-{}^3CH_2-{}^4CH_2-{}^5CH_2-{}^6CH_2-{}^7CH_3$$

To make it chiral compound the attack should be on which carbon atom

(a) 1 (b) 3

(c) 4 (d) 7

19. If the light waves pass through a nicol prism then all the oscillations occur only in one plane, such beam of light is called as

(a) Non-polarised light (b) Plane polarised light

(c) Polarised light (d) Optical light

20. Disymmetric object is one which is

(a) Superimposable on its mirror image

(b) Non-superimposable on its mirror image

(c) Optically inactive

(d) Achiral

21. What is the possible number of optical isomers for a compound containing 2-dissimilar asymmetric carbon atom

(a) 2 (b) 4

(c) 6 (d) 8

22. A compound whose molecules are superimposable on their mirror images even though they contain an asymmetric carbon atom is called

(a) A meso compound (b) An erythro isomer

(c) A threo isomer (d) A glycol

23. Which of the following compound is expected to be optically active

(a) $(CH_3)_2CHCHO$ (b) $CH_3CH_2CH_2CHO$

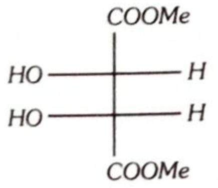
(c) $CH_3CH_2CHBr\ CHO$ (d) $CH_3CH_2CBr_2CHO$

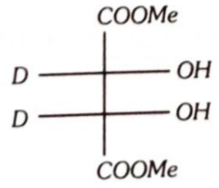
24. Which will show optical isomerism

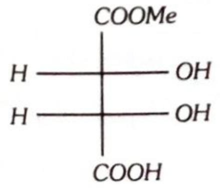
(a) 3, 3-dichloropentane (b) 2-chloro-2-butanol

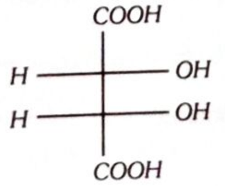
(c) 2-chloro-2-propanol (d) All of these

25. The optically active molecule is

(a)


(b)


(c)


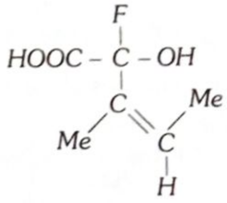
(d)


26. Which among the following functional groups has been given the highest priority while assigning R-S configuration

(a) $-C_6H_5$ (b) $-CN$

(c) $-C_2H_5$ (d) $-CH_3$

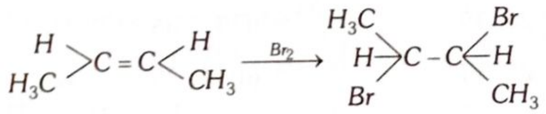
27. The configuration of the chiral centre and the geometry of the double bond in the following molecule can be described by



(a) R and E (b) S and E

(c) R and Z (d) S and Z

28. Products of the reaction



are

(a) *Meso*-compounds

(b) Racemic mixtures

(c) Mixtures of racemic and meso-compounds

(d) None of the above

29. Which compound is optically active

(a) 4-chloro, 1-hydroxy butane

(b) 3° -butyl alcohol

(c) Secondary butyl amine

(d) *n*-butyl alcohol

30. Which of the following statements is not true about enantiomers

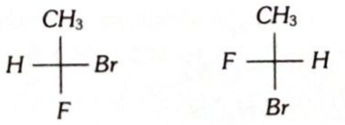
(a) They have same physical properties

(b) They have different biological properties

(c) They have same chemical properties towards chiral compounds

(d) None of these

31. Consider the following representation



They are

(a) Enantiomers (b) Diastereomers

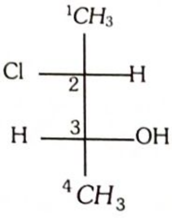
(c) Conformational isomers (d) Identical

(e) Cis–trans isomers

32. The number of racemic mixture obtained by optical isomers of 2, 3-dihydroxy butanal is/are

(a) Three (b) Two
(c) One (d) Zero

33. The absolute configurations of the C_2 and C_3 atoms in the molecule with the structure is



(a) 2*S*, 3*S* (b) 2*R*, 3*S*
(c) 2*S*, 3*R* (d) 2*R*, 3*R*

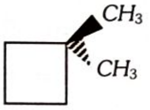
34. While assigning *R*, *S* configuration the correct order of priority of groups attached to chiral carbon atom is

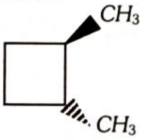
(a) $CONH_2 > COCH_3 > CH_2OH > CHO$
(b) $CONH_2 > COCH_3 > CHO > CH_2OH$
(c) $COCH_3 > CONH_2 > CHO > CH_2OH$
(d) $CHO > CH_2OH > COCH_3 > CONH_2$

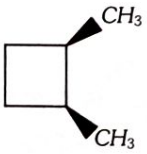
35. How many chiral isomers can be drawn from 2-bromo-3-chloro butane

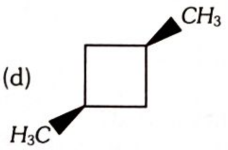
(a) 2 (b) 3
(c) 4 (d) 5

36. Which of the following is a chiral molecule

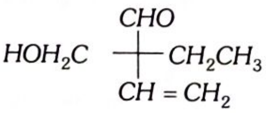
(a)


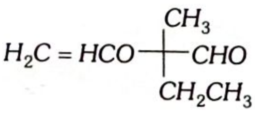
(b)


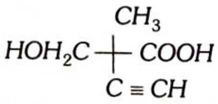
(c)


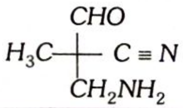
(d)


37. Which of the following will not lose asymmetry on reduction with $LiAlH_4$

(a)

$HOH_2C-\overset{CHO}{\underset{CH=CH_2}{C}}-CH_2CH_3$

(b)

$H_2C=HCO-\overset{CH_3}{\underset{CH_2CH_3}{C}}-CHO$

(c)

$HOH_2C-\overset{CH_3}{\underset{C\equiv CH}{C}}-COOH$

(d)

$H_3C-\overset{CHO}{\underset{CH_2NH_2}{C}}-C\equiv N$

38. Glucose has optical isomers

(a) 8 (b) 12
(c) 16 (d) Cannot be predicted

39. The optical rotation of an optically active compound is

(a) Directly proportional to length of the polarimeter tube only
(b) Directly proportional to the molar concentration of the compound
(c) Independent of the length of the polarimeter tube and concentration of the compound
(d) Directly proportional to both the length of the polarimeter tube and molar concentration of the compound

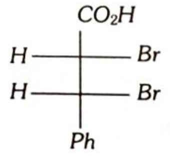
40. In a mixture, two enantiomers are found to be present in 85% and 15% respectively. The enantiomeric excess(e, e) is

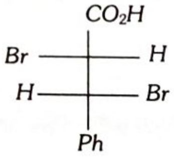
(a) 85% (b) 15%
(c) 70% (d) 60%

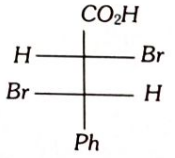
41. When (–)-2-methylbutan-1-ol is heated with concentrated hydrochloric acid, (+)1-chloro-2-methylbutane is obtained. The reaction is an example of

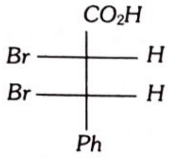
(a) Retention (b) Inversion
(c) Racemisation (d) Resolution
(e) Mutarotation

42. The structure of 2*R*, 3*S*-dibromocinnamic acid is

(a)


(b)


(c)


(d)


43. Least hindered rotation about carbon-carbon bond is observed in

(a) Ethane (b) Ethylene
(c) Ethyne (d) Hexachloroethane

44. The maximum number of stereoisomers possible for 2-hydroxy-2-methyl butanoic acid is

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

45. Among the following pairs, the pair that illustrates stereoisomerism is

(a) 1-butanol and 2-butanol
(b) *Cis*-2-butene and *trans*-2-butene
(c) Dimethyl ether and ethanol
(d) Acetone and propanal
(e) Ethanol and ethanal

46. On bromination, propionic acid yields two isomeric 2-bromopropionic acids. This pair is an important example of

(a) Chain isomers (b) Optical isomers

(c) Cis-trans isomers (d) Position isomers

47. Which kind of isomerism is possible for 1-chloro-2-nitroethene

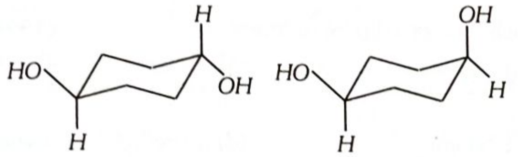
(a) Functional group isomerism

(b) Position isomerism

(c) E/Z isomerism

(d) Optical isomerism

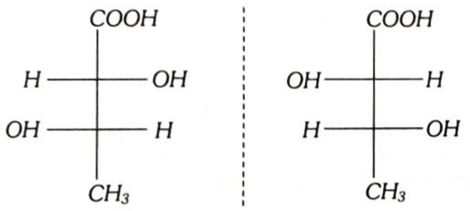
48. The correct relation between the following pair of compounds is



(a) Constitutional isomers (b) Enantiomers

(c) Diastereomers (d) None of these

49.



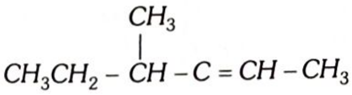
Pair is known as

(a) Erythro stereoisomers (b) Threo stereoisomers

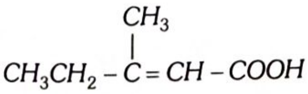
(c) Structure isomers (d) Geometrical isomers

50. Which of the following compounds can exhibit both geometrical isomerism and enantiomerism

(a) $CH_3-CH=CH=CH_3$

(b) 

$CH_3CH_2-\overset{CH_3}{\overset{|}{CH}}-C=CH-CH_3$

(c) 

$CH_3CH_2-\overset{CH_3}{\overset{|}{C}}=CH-COOH$

(d) $CH_3-CHOH-COOH$

51. The total number of acylic isomers including the stereoisomers with the molecular formula C_4H_7Cl

(a) 11 (b) 12

(c) 9 (d) 10

52. A compound is formed by substitution of two chlorine for two hydrogens in propane. The number of possible isomeric compounds is

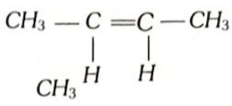
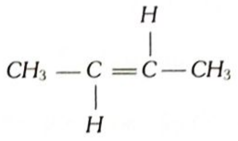
(a) 4 (b) 3

(c) 5 (d) 2

53. Identify the stereoisomer pair from the following choices

(a) $CH_3CH_2CH_2OH$ and $CH_3CH_2OCH_3$

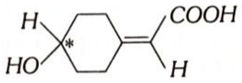
(b) $CH_3CH_2CH_2Cl$ and $CH_3CHClCH_3$

(c)  and 

$CH_3-\underset{CH_3\ H}{\underset{|}{C}}=\underset{H}{\underset{|}{C}}-CH_3$ and $CH_3-\underset{H}{\underset{|}{C}}=\overset{H}{\overset{|}{C}}-CH_3$

(d)  and 

54. Two possible stereoisomers for

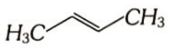
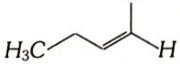


are

(a) Enantiomers (b) Diastereomers

(c) Conformers (d) Rotamers

55. The following two compounds are

(a) Geometrical isomers (b) Positional isomers

(c) Functional group isomers (d) Optical isomers

56. The compound that readily tautomerizes is

(a) $CH_3COCH_2CO_2C_2H_5$ (b) $CH_3COCH_2CHCH_3$

(c) $CH_3COCH_2CH_2CH_3$ (d) $(CH_3)_3CCOC(CH_3)_3$

57. The number of isomers which are ethers and having the molecular formula $C_4H_{10}O$, is

(a) 2 (b) 3

(c) 4 (d) 5

58. The number of stereoisomer possible for the following compound is $CH_3-CH=CH-CH(Br)-CH_2-CH_3$

(a) 2 (b) 3

(c) 4 (d) 8

59. The number of stereoisomers possible for the following compound is $CH_3-CH=CH-CH(OH)-CH_3$

(a) 1 (b) 2

(c) 3 (d) 4

60. Which of the following molecules can exhibit optical activity

(a) 1–bromopropane (b) 2–bromobutane

(c) 3–bromopentane (d) Bromocyclohexane

5. IIT-JEE/ AIEEE

1. The bond between carbon atom (1) and carbon atom (2) in compound $N \equiv C - CH = CH_2$ involves the hybridised carbon as **[1987]**

(a) sp^2 and sp^2 (b) sp^3 and sp

(c) sp and sp^2 (d) sp and sp

2. Number of σ and π bonds present in 1- butene-3-yne respectively are **[1989]**

(a) $7\sigma, 3\pi$ (b) $5\sigma, 2\pi$

(c) $8\sigma, 3\pi$ (d) $6\sigma, 2\pi$

3. In which of the following species is the underlined carbon having sp^3 hybridisation **[2002]**

(a) $CH_3\underline{C}OOH$ (b) $CH_3\ \underline{C}H_2OH$

(c) $CH_3\underline{C}OCH_3$ (d) $CH_2 = \underline{C}H - CH_3$

4. The hybridisation of carbons of $C - C$ single bond of $HC \equiv C - CH = CH_2$ is **[199]**

(a) $sp^3 - sp^3$ (b) $sp - sp^2$

(c) $sp^3 - sp$ (d) $sp^2 - sp^3$

5. Maximum carbon-carbon bond distance is found in **[1981]**

(a) Ethyne (b) Ethene

(c) Ethane (d) Benzene

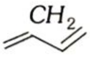
6. C-H bond length is greatest in **[1989]**

(a) C_2H_2 (b) C_2H_4

(c) C_2H_6 (d) $C_2H_2Br_2$

7. Which of the following represents the given mode of hybridisation sp^2-sp^2-sp-sp from left to right **[2003]**

(a) $H_2C = CH - C \equiv CH$ (b) $HC \equiv C - C \equiv CH$

(c) $H_2C = C = C = CH_2$ (d) CH_2 

8. Number of π electrons in cyclobutadienyl anion $(C_4H_3)^-$ is **[1991]**

(a) 2 (b) 4

(c) 6 (d) 8

9. Which one of the following does not have sp^2 hybridised carbon **[2004]**

(a) Acetonitrile (b) Acetic acid

(c) Acetone (d) Acetamide

10. The enolic form of acetone contains **[1990]**

(a) 8σ-bonds, 2π-bonds and 1 lone pairs

(b) 9σ-bonds, 1π-bond and 2 lone pairs

(c) 9σ-bonds, 2π-bonds and 1 lone pairs

(d) 10σ-bonds, 1π-bonds and 1 lone pairs

11. In allene (C_3H_4), the type(s) of hybridisation of the carbon atoms is (are) **[2012]**

(a) sp and sp^3 (b) sp and sp^2

(c) Only sp^2 (d) sp^2 and sp^3

12. Which has zero dipole moment **[1994; 1996]**

(a) *Cis*-2-butene (b) *Trans*-2-butene

(c) 1-butene (d) 2-methyl-1-propene

13. Among the following mixtures, dipole-dipole as the major interaction, is present in **[2006]**

(a) Benzene and ethanol

(b) Acetonitrile and acetone

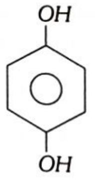
(c) KCl and water

(d) Benzene and carbon tetrachloride

14. For which of the following molecule, significant $\mu \neq 0$

(1) 

(2) 

(3) 

(4) 

(a) Only (1) (b) (1) and (2)

(c) Only (3) (d) (3) and (4)

15. Resonance structure of molecule does not have **[1984]**

(a) Identical arrangement of atoms

(b) Nearly the same energy content

(c) The same number of paired electrons

(d) Identical bonding

16. Arrangement of $(CH_3)_3-C,-(CH_3)_2-CH,-CH_3-CH_2$ when attached to benzyl or an unsaturated group in increasing order of inductive effect is **[2002]**

(a) $(CH_3)_3-C- < (CH_3)_2-CH- < CH_3-CH_2-$

(b) $CH_3-CH_2- < (CH_3)_2-CH- < (CH_3)_3-C-$

(c) $(CH_3)_2-CH- < (CH_3)_3-C- < CH_3-CH_2-$

(d) $(CH_2)_3-C- < CH_3-CH_2- < (CH_3)_2-CH-$

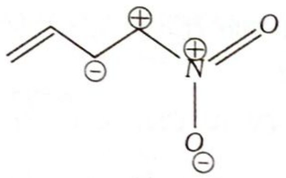
17. In CH_3CH_2OH, the bond that undergoes heterolytic cleavage most readily is **[1988]**

(a) $C-C$ (b) $C-O$

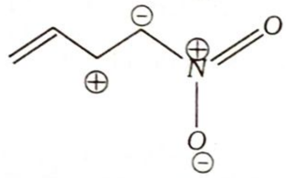
(c) $C-H$ (d) $O-H$

18. Among the following, the least stable resonance structure is **[2007]**

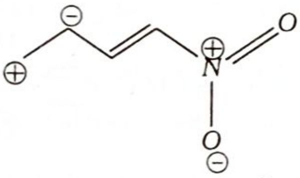
(a)



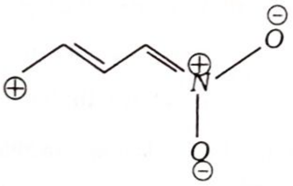
(b)



(c)



(d)

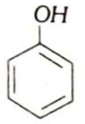


19. Hyperconjugation involves overlap of the following orbitals **[2008]**

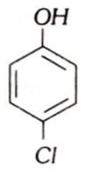
(a) $\sigma-\sigma$ (b) $\sigma-p$

(c) $p-p$ (d) $\pi-\pi$

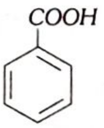
20. The correct acidity order of the following is **[2009]**



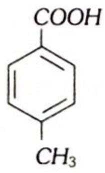
(I)



(II)



(III)

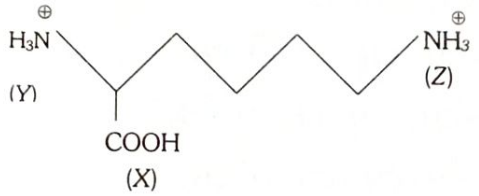


(IV)

(a) (III) > (IV) > (II) > (I) (b) (IV) > (III) > (I) > (II)

(c) (III) > (II) > (I) > (IV) (d) (II) > (III) > (IV) > (I)

21. In the compound given below



The correct order of the acidity of the positions (X), (Y) and (Z) is **[2004]**

(a) (Z) > (X) > (Y) (b) (X) > (Y) > (Z)

(c) (X) > (Z) > (Y) (d) (Y) > (X) > (Z)

22. Arrange the carbanions, $(CH_3)_3\overline{C}, \overline{C}Cl_3, (CH_3)_2\overline{C}H, C_6H_5\overline{C}H_2$, in order of their decreasing stability **[2009]**

(a) $C_6H_5\overline{C}H_2 > \overline{C}Cl_3 > (CH_3)_3\overline{C} > (CH_3)_2\overline{C}H$

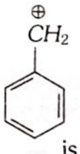
(b) $(CH_3)_2\overline{C}H > \overline{C}Cl_3 > C_6H_5\overline{C}H_2 > (CH_3)_3\overline{C}$

(c) $\overline{C}Cl_3 > C_6H_5\overline{C}H_2 > (CH_3)_2\overline{C}H > (CH_3)_3\overline{C}$

(d) $(CH_3)_3\overline{C} > (CH_3)_2)\overline{C}H > C_6H_5\overline{C}H_2 > \overline{C}Cl_3$

23. The order of stability of the following carbocations

$\underset{\text{I}}{CH_2 = CH - \overset{\oplus}{C}H_2}$; $\underset{\text{II}}{CH_3 - CH_2 - \overset{\oplus}{C}H_2}$;

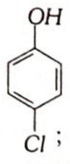


III is **[2013]**

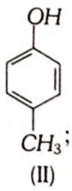
(a) III > II > I (b) II > III > I

(c) I > II > III (d) III > I > II

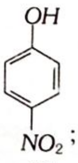
24. Arrange the following compounds in order of decreasing acidity



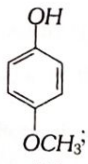
(I)



(II)



(III)



(IV) **[2013]**

(a) II > IV > I > III (b) I > II > III > IV

(c) III > I > II > IV (d) IV > III > I > II

25. Which one of the following species is most stable **[1995]**

(a) $p-O_2N-C_6H_4-\overset{+}{C}H_2$ (b) $p-CH_3O-C_6H_4-\overset{+}{C}H_2$

(c) $p-Cl-C_6H_4-\overset{+}{C}H_2$ (d) $C_6H_5-\overset{+}{C}H_2$

26. Which of the following resonating structures of 1-methoxy-1, 3-butadiene is least stable **[2005]**

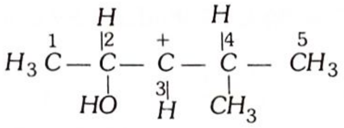
(a) $\overset{-}{C}H_2 - CH = CH - CH = \overset{\oplus}{O} - CH_3$

(b) $CH_2 = CH_2 - \overset{-}{C}H - CH = \overset{\oplus}{O} - CH_3$

(c) $\overset{-}{C}H_2 - \overset{\oplus}{C}H - CH = CH - O - CH_3$

(d) $CH_2 = CH - \overset{-}{C}H - \overset{\oplus}{C}H - O - CH_3$

27. In the following carbocation, H/CH_3 that is most likely to migrate to the positively charged carbon is **[2009]**

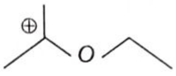


$$\overset{1}{H_3C} - \overset{H}{\underset{HO}{\overset{|2}{C}}} - \underset{H}{\overset{+}{\underset{3|}{C}}} - \overset{H}{\underset{CH_3}{\overset{|4}{C}}} - \overset{5}{CH_3}$$

(a) CH_3 at $C-4$ (b) H at $C-4$

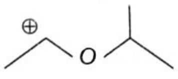
(c) CH_3 at $C-2$ (d) H at $C-2$

28. The correct stability order for the following species is

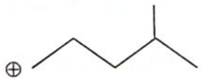


(I)

(II)



(III)



(IV)

[2008]

(a) (II)>(IV)>(I)>(III) (b) (I)>(II)>(III)>(IV)

(c) (II)>(I)>(IV)>(III) (d) (I)>(III)>(II)>(IV)

29. Due to the presence of an unpaired electron, free radicals are **[2005]**

(a) Chemically reactive (b) Chemically inactive
(c) Anions (d) Cations

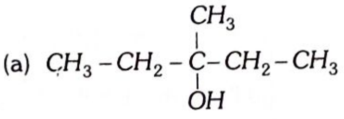
30. Homolytic fission of $C - C$ bond in ethane gives an intermediate in which carbon is **[1992]**

(a) sp^3 hybridised (b) sp^2 hybridised

(c) sp hybridised (d) sp^3d hybridized

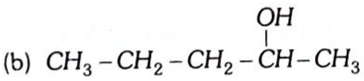
31. Among the following compounds which can be dehydrated very easily is **[2004]**

(a)



$$CH_3 - CH_2 - \overset{CH_3}{\underset{OH}{\overset{|}{\underset{|}{C}}}} - CH_2 - CH_3$$

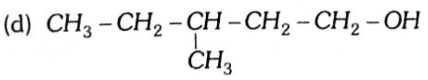
(b)



$$CH_3 - CH_2 - CH_2 - \overset{OH}{\overset{|}{C}H} - CH_3$$

(c) $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - OH$

(d)



$$CH_3 - CH_2 - \underset{CH_3}{\underset{|}{C}H} - CH_2 - CH_2 - OH$$

32. Which of the following has the highest nucleophilicity **[2000]**

(a) F^- (b) OH^-

(c) CH_3^- (d) NH_2^-

33. Which behaves both as a nucleophile and electrophile **[1991]**

(a) CH_3NH_2 (b) CH_3Cl

(c) CH_3CN (d) CH_3OH

34. In the following groups

$-OAc$	$-OMe$	$-OSO_2Me$	$-OSO_2CF_3$
I	II	III	IV

The order of leaving group ability is **[1997]**

(a) I > II > III > IV (b) IV > III > I > II

(c) III > II > I > IV (d) II > III > IV > I

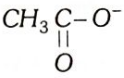
35. The reaction of propene with $HOCl\ (Cl_2 + H_2O)$ proceeds through the intermediate **[2016]**

(a) $CH_3 - CH^+ - CH_2 - Cl$ (b) $CH_3 - CH(OH) - CH_2^+$

(c) $CH_3 - CHCl - CH_2^+$ (d) $CH_3 - CH^+ - CH_2 - OH$

36. The decreasing order of nucleophilicity among the nucleophiles

(i)

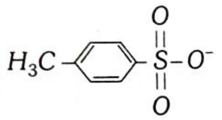


$$CH_3\underset{O}{\underset{||}{C}} - O^-$$

(ii) CH_3O^-

(iii) CN^-

(iv)



is **[2005]**

(a) (i), (ii), (iii), (iv) (b) (iv), (iii), (ii), (i)

(c) (ii), (iii), (i), (iv) (d) (iii), (ii), (i), (iv)

37. In S_{N^2} reactions, the correct order of reactivity for the following compounds: CH_3Cl, CH_3CH_2Cl, $(CH_3)_2CHCl$ and $(CH_3)_3CCl$ is **[2014]**

(a) $CH_3Cl > (CH_3)_2CHCl > CH_3CH_2Cl > (CH_3)_3CCl$

(b) $CH_3Cl > CH_3CH_2Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

(c) $CH_3CH_2Cl > CH_3Cl > (CH_3)_2CHCl > (CH_3)_3CCl$

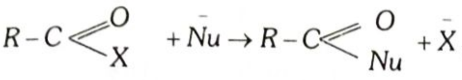
(d) $(CH_3)_2CHCl > CH_3CH_2Cl > CH_3Cl > (CH_3)_3CCl$

38. Tertiary alkyl halides are practically inert to substitution by S_{N^2} mechanism because of **[2005]**

(a) Insolubility (b) Instability

(c) Inductive effect (d) Steric hindrance

39. The reaction


$R-C\overset{O}{\underset{X}{\lessgtr}} + \overset{-}{Nu} \rightarrow R-C\overset{O}{\underset{Nu}{\lessgtr}} + \overset{-}{X}$, is fastest when X is **[2005]**

(a) Cl (b) NH_2

(c) OC_2H_5 (d) $OCOR$

40. Elimination of bromine from 2-bromobutane results in the formation of **[2004, 05]**

(a) Equimolar mixture of 1 and 2-butene

(b) Predominantly 2-butene

(c) Predominantly 1-butene

(d) Predominantly 2-butyne

41. What is the decreasing order of reactivity amongst the following compounds towards aromatic electrophilic substitution

I. Chlorobenzene II. Benzene

III. Anilinium chloride IV. Toluene

[1995]

(a) I > II > III > IV (b) IV > II > I > III

(c) II > I > III > IV (d) III > I > II > IV

42. HBr reacts with $CH_2=CH-OCH_3$ under anhydrous conditions at room temperature to give **[2006]**

(a) CH_3CHO and CH_3Br

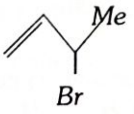
(b) $BrCH_2CHO$ and CH_3OH

(c) $BrCH_2-CH_2-OCH_3$

(d) $H_3C-CHBr-OCH_3$

43. Consider the following bromides

Ⓐ



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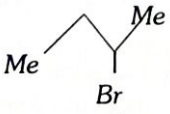


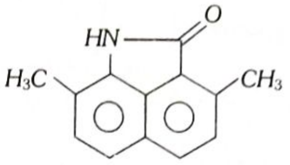
Ⓒ

The correct order of S_{N^1} reactivity is **[2010]**

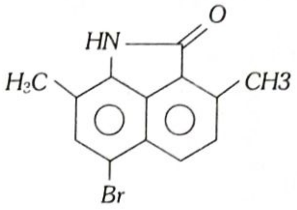
(a) A > B > C (b) B > C > A

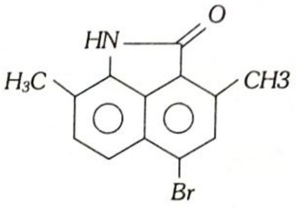
(c) B > A > C (d) C > B > A

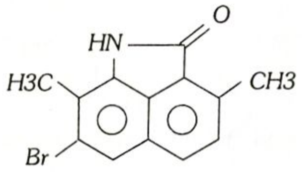
44. The major product obtained when Br_2/Fe is treated with

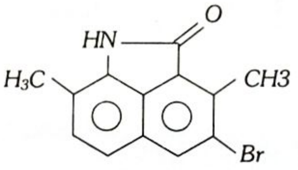


is **[2004]**

(a)


(b)


(c)


(d)


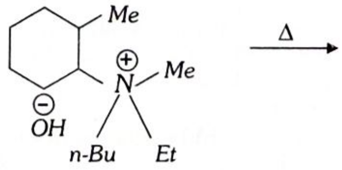
45. $CH_3Br + Nu^- \rightarrow CH_3-Nu + Br^-$

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

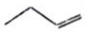
$[Nu^- = (A)PhO^-, (B)AcO^-, (C)HO^-, (D)CH_3O^-]$ **[2006]**

(a) $D > C > A > B$ (b) $D > C > B > A$

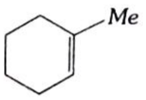
(c) $A > B > C > D$ (d) $B > D > C > A$

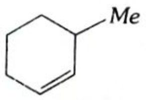
46.


The alkene formed as a major product in the above elimination reaction is **[2006]**

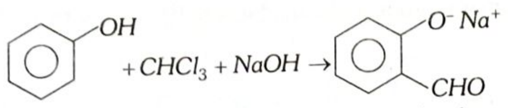
(a) Me


(b) $CH_2=CH_2$

(c)


(d)


47.



The electrophile involved in the above reaction is **[2006]**

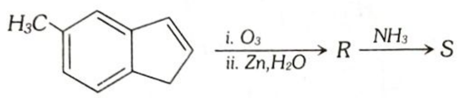
(a) Dichloromethyl cation $(\overset{\oplus}{C}HCl_2)$

(b) Dichlorocarbene $(: CCl_2)$

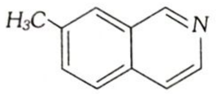
(c) Trichloromethyl anion $(\overset{\ominus}{C}Cl_3)$

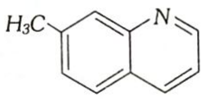
(d) Formyl cation (CHO)

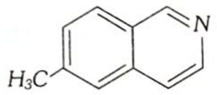
48. In the following reactions, the product S is

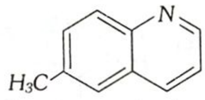


[2015]

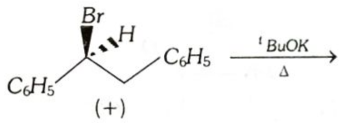
(a)


(b)


(c)


(d)


49. The major product obtained in the following reaction is



[2017]

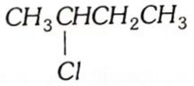
(a) $C_6H_5CH = CHC_6H_5$

(b) $(+)C_6H_5CH(O^tBu)CH_2C_6H_5$

(c) $(-)C_6H_5CH(O^tBu)CH_2C_6H_5$

(d) $(\pm)C_6H_5CH(O^tBu)CH_2C_6H_5$

50. The increasing order of the reactivity of the following halides for the S_{N^1} reaction is

(i)

$CH_3\underset{\underset{Cl}{|}}{C}HCH_2CH_3$

(ii) $CH_3CH_2CH_2Cl$

(iii) $p-H_3CO-C_6H_4-CH_2Cl$ **[2017]**

(a) (ii) < (i) < (iii)
(b) (i) < (iii) < (ii)
(c) (ii) < (iii) < (i)
(d) (iii) < (ii) < (i)

51. The compound $C_4H_{10}O$ can show **[1981]**

(a) Metamerism
(b) Functional isomerism
(c) Positional isomerism
(d) All types

52. For which of the following parameters the structural isomers C_2H_5OH and CH_3OCH_3 would be expected to have the same values (Assume ideal behaviour) **[2004]**

(a) Boiling points

(b) Vapour pressure at the same temperature

(c) Heat of vaporization

(d) Gaseous densities at the same temperature and pressure

53. The number of structural isomers for C_6H_{14} is **[2007]**

(a) 3
(b) 4
(c) 5
(d) 6

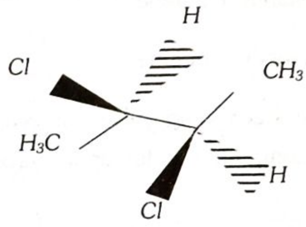
54. Which of the following compounds will exhibit geometrical isomerism **[2000; 2015]**

(a) 1-phenyl-2-butene
(b) 3-phenyl-1-butene
(c) 2-phenyl-1-butene
(d) 1, 1-diphenyl-1-propene

55. Which of the following does not show geometrical isomerism **[2002]**

(a) 1, 2-dichloro-1-pentene
(b) 1, 3-dichloro-2-pentene
(c) 1, 1-dichloro-1-pentene
(d) 1, 4-dichloro-2-pentene

56. The correct statement(s) about the compound given below is (are) **[2008]**



(a) The compound is optically active

(b) The compound possesses centre of symmetry

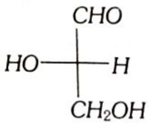
(c) The compound possesses plane of symmetry

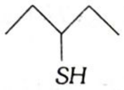
(d) The compound possesses axis of symmetry

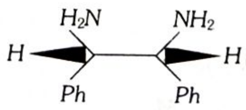
57. Racemic mixture is formed by mixing two **[2002]**

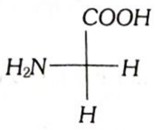
(a) Isomeric compounds
(b) Chiral compounds
(c) Meso compounds
(d) Optical isomers

58. Which of the following molecules is expected to rotate the plane polarized light **[2007]**

(a)


(b)


(c)


(d)


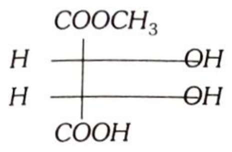
59. The number of stereoisomers possible for a compound of the molecular formula $CH_3-CH=CH-CH(OH)-Me$ is **[2009]**

(a) 3
(b) 2
(c) 4
(d) 6

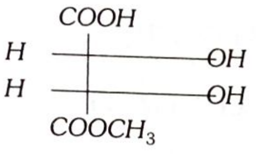
60. An enantiomerically pure acid is treated with racemic mixture of an alcohol having one chiral carbon. The ester formed will be **[2003]**

(a) Optically active mixture
(b) Pure enantiomer
(c) Meso compound
(d) Racemic mixture

61. The correct statement about the compounds A and B is **[1997]**



(A)



(B)

(a) A and B are identical

(b) A and B are diastereomers

(c) A and B are enantiomers

(d) None of these

62. Which of the following will have a mesoisomer also **[2004]**

(a) 2, 3-dichloropentane

(b) 2, 3-dichlorobutane

(c) 2-chlorobutane

(d) 2-hydroxypropanoic acid

63. Out of the following the alkene that exhibits optical isomerism is **[2010]**

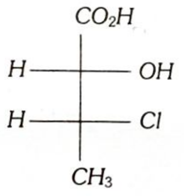
(a) 2-methyl-2-pentene

(b) 3-methyl-2-pentene

(c) 4-methyl-1-pentene

(d) 3-methyl-1-pentene

64. The absolute configuration of



[2016]

(a) (2S, 3R)

(b) (2S, 3S)

(c) (2R, 3R)

(d) (2R, 3S)

65. The optically active tartaric acid is named as D-(+)- tartaric acid because it has a positive **[1999]**

(a) Optical rotation and is derived from D-glucose

(b) pH in organic solvent

(c) Optical rotation and is derived from $D(+)$ glyceraldehyde

(d) Optical rotation only when substituted by deuterium

66. On monochlorination of 2-methyl butane, the total number of chiral compounds is **[2004; 2012]**

(a) 2

(b) 4

(c) 6

(d) 8

67. Which of the following compounds is not chiral **[2004]**

(a) 1-chloro-2-methyl pentane

(b) 2-chloropentane

(c) 1-chloropentane

(d) 3-chloro-2-methyl pentane

68. A solution of D (+) - 2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of $SbCl_5$, due to the formation of **[1999; 2013]**

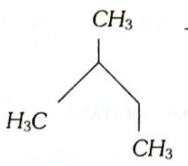
(a) Carbanion

(b) Carbene

(c) Free radical

(d) Carbocation

69.



$\xrightarrow{Cl_2/h\nu}$ N (isomeric product)

$C_5H_{11}Cl \xrightarrow{\text{fractional distillation}}$ M (isomeric product)

What are N and M **[2006]**

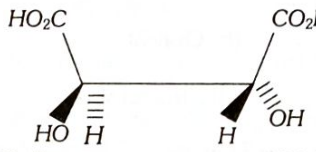
(a) 6, 6

(b) 6, 4

(c) 4, 4

(d) 3, 3

70. The absolute configuration of



is **[2008]**

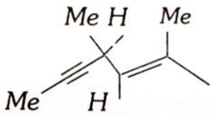
(a) R, R

(b) R, S

(c) S, R

(d) S, S

71. Hydrogenation of the adjoining compound in the presence of poisoned palladium catalyst gives **[2001]**



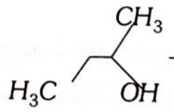
(a) An optically active compound

(b) An optically inactive compound

(c) A racemic mixture

(d) A diastereomeric mixture

72.



$\xrightarrow[-H_2O]{H^+} [F] \xrightarrow{Br_2/CCl_4} \underbrace{C_4H_8Br_2}_{\text{5 such products are possible}}$

How many structures of F is possible **[2003]**

(a) 2

(b) 5

(c) 6

(d) 3

73. The number of stereoisomers obtained by bromination of trans–2–butene is **[2007]**

(a) 1

(b) 2

(c) 3

(d) 4

74. α – D-(+)-glucose and β -D-(+)-glucose are **[2008]**

(a) Epimers

(b) Anomers

(c) Enantiomers

(d) Conformers

75. Name the compound, that is not isomer with diethyl ether **[1981]**

(a) *n*-propylmethyl ether (b) Butane-1-ol

(c) 2-methylpropane-2-ol (d) Butanone

76. A similarity between optical and geometrical isomerism is that **[2002]**

(a) Each forms equal number of isomers for a given compound

(b) If in a compound one is present then so is the other

(c) Both are included in stereoisomerism

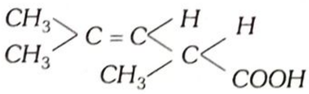
(d) They have no similarity

77. Which types of isomerism is shown by 2, 3-dichlorobutane **[2005]**

(a) Distereo (b) Optical

(c) Geometric (d) Structural

78. The following compound can exhibits



[1995]

(a) Tautomerism

(b) Optical isomerism

(c) Geometrical isomerism

(d) Geometrical and optical isomerisms

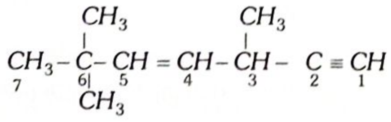
79. The number of isomers for the compound with molecular formula $C_2BrClFI$ is **[2001]**

(a) 3 (b) 4

(c) 5 (d) 6

6. NEET/ AIPMT/ CBSE-PMT

1. The state of hybridization of C_2, C_3, C_5 and C_6 of the hydrocarbon



$$\underset{7}{CH_3}-\underset{6}{\overset{CH_3}{\underset{CH_3}{C}}}-\underset{5}{CH}=\underset{4}{CH}-\underset{3}{\overset{CH_3}{CH}}-\underset{2}{C}\equiv\underset{1}{CH}$$

is in the following sequence **[2009]**

(a) sp, sp^3, sp^2 and sp^3 (b) sp^3, sp^2, sp^2 and sp

(c) sp, sp^2, sp^2 and sp^3 (d) sp, sp^2, sp^3 and sp^2

2. In which of the compounds given below is there more than one kind of hybridisation (sp, sp^2, sp^3) for carbon **[1995]**

(i) $CH_3CH_2CH_2CH_3$

(ii) $CH_3-CH=CH-CH_3$

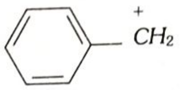
(iii) $CH_2=CH-CH=CH_2$

(iv) $H-C\equiv C-H$

(a) (ii) and (iv) (b) (i) and (iv)

(c) (ii) and (iii) (d) (ii)

3. What is the hybridisation state of benzyl carbonium ion

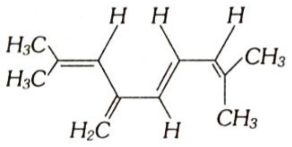


[2013]

(a) sp^2 (b) spd^2

(c) sp^2d (d) sp^3

4. The total number of $\pi-$bond electrons in the following structure is



[2015]

(a) 8 (b) 12

(c) 16 (d) 4

5. Carbon-carbon bond length is minimum in **[1988, 91]**

(a) Ethane (b) Ethene

(c) Ethyne (d) Benzene

(e) Ethanol

6. The correct order of increasing bond length of $C-H, C-O, C-C$ and $C=C$ is **[2011]**

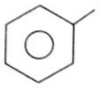
(a) $C-H < C-O < C-C < C=C$

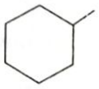
(b) $C-H < C=C < C-O < C-C$

(c) $C-C < C=C < C-O < C-H$

(d) $C-O < C-H < C-C < C=C$

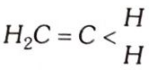
7. Examine the following common chemical structures to which simple functional groups are often attached

(i) 

(ii) 

(iii) 

(iv) $CH_3CH_2CH_2CH_2-$

(v) 

$H_2C=C<\begin{matrix}H\\H\end{matrix}$

Which of these systems have essentially planar geometry **[1995]**

(a) (i) and (v)
(b) (ii) and (iii)
(c) (ii), (iii) and (iv)
(d) (iv)

8. Considering the state of hybridization of carbon atoms, find out the molecule among the following which is linear **[2011]**

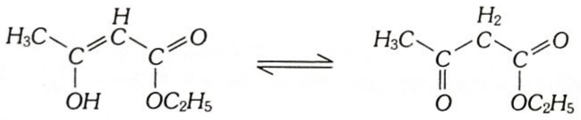
(a) $CH_3-CH_2-CH_2-CH_3$

(b) $CH_3-CH=CH-CH_3$

(c) $CH_3-C\equiv C-CH_3$

(d) $CH_2=CH-CH_2-C\equiv CH$

9. The enolic form of ethyl acetoacetate as below has **[2015]**



(a) 16 sigma bonds and 1 pi - bond

(b) 9 sigma bonds and 2 pi - bond

(c) 9 sigma bonds and 1 pi - bond

(d) 18 sigma bonds and 2 pi - bond

10. The pair of electrons in the given carbanion $CH_3C\equiv C^-$, is present in which of the following orbitals **[2016]**

(a) $2p$
(b) sp^3
(c) sp^2
(d) sp

11. Which of the following $C-H$ bond has the lowest bond dissociation energy **[2000]**

(a) Primary (1°) $C-H$ bond

(b) Secondary (2°) $C-H$ bond

(c) Tertiary (3°) $C-H$ bond

(d) All of these

12. Basic strength of

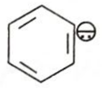
(i) $H_3C\overset{\ominus}{C}H_2$
(ii) $H_2C=\overset{\ominus}{C}H$
(iii) $H-C\equiv\overset{\ominus}{C}$

is in the order of **[2008]**

(a) (i)>(iii)>(ii)
(b) (i)>(ii)>(iii)
(c) (ii)>(i)>(iii)
(d) (iii)>(ii)>(i)

13. The stability of carbanions in the following

(i) $RC\equiv\overset{\ominus}{C}$

(ii) 

(iii) $R_2C=\overset{\ominus}{C}H$

(iv) $R_3C-\overset{\ominus}{C}H_2$

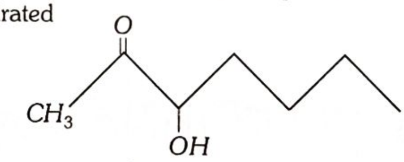
[2008]

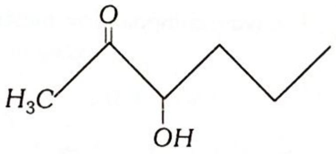
(a) (iv)>(ii)>(iii)>(i)
(b) (i)>(iii)>(ii)>(iv)
(c) (i)>(ii)>(iii)>(iv)
(d) (ii)>(iii)>(iv)>(i)

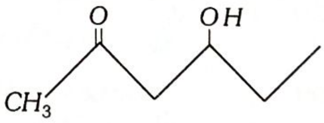
14. Which one of the following orders is correct regarding the inductive effect of the substituents **[1998]**

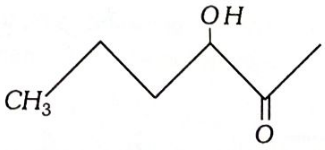
(a) $-NR_2<-OR>-F$
(b) $-NR_2>-OR>-F$
(c) $-NR_2<-OR<-F$
(d) $-NR_2>-OR<-F$

15. Which one of the following compound will be most readily dehydrated **[2010]**

(a) 

(b) 

(c) 

(d) 

16. Arrange the following in increasing order of stability **[2013]**

(1) $(CH_3)_2\overset{\oplus}{C}-CH_2-CH_3$
(2) $(CH_3)_3\overset{\oplus}{C}$
(3) $(CH_3)_2\overset{\oplus}{C}H$
(4) $CH_3\overset{\oplus}{C}H_2$
(5) $\overset{\oplus}{C}H_3$

(a) $5<4<3<1<2$
(b) $4<5<3<1<2$
(c) $1<5<4<3<2$
(d) $5<4<3<2<1$

17. Homolytic fission of the following alkanes form free radicals CH_3-CH_3, $CH_3-CH_2-CH_3(CH_3)_2CH-CH_3$, $CH_3-CH_2-CH(CH_3)_2$ Increasing order of stability of the radicals is **[2013]**

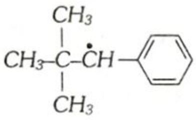
(a) $(CH_3)_2\dot{C}-CH_2CH_3 < CH_3-\dot{C}H-CH_3 < CH_3-\dot{C}H_2 < (CH_3)_3\dot{C}$

(b) $CH_3-\dot{C}H_2 < CH_3-\dot{C}H-CH_3 < (CH_3)_2\dot{C}-CH_2CH_3 < (CH_3)_3\dot{C}$

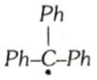
(c) $CH_3-\dot{C}H_2 < CH_3-\dot{C}H-CH_3 < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}-CH_2CH_3$

(d) $(CH_3)_3\dot{C} < (CH_3)_2\dot{C}-CH_2-CH_3 < CH_3-\dot{C}H-CH_3 < CH_3-\dot{C}H_2$

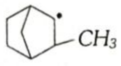
18. Consider the following compound. Hyperconjugation occurs in



(I)



(II)



(III)

[2015]

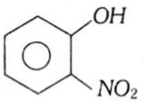
(a) II only (b) III only

(c) I and III (d) I only

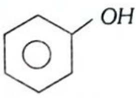
19. Which one of the following compounds is most acidic **[2005]**

(a) $Cl-CH_2-CH_2-OH$

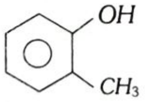
(b)



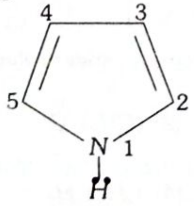
(c)



(d)



20. In pyrrole



The electron density is maximum on **[2016]**

(a) 2 and 5 (b) 2 and 3

(c) 3 and 4 (d) 2 and 4

21. Which of the following statements is not correct for a nucleophile **[2015]**

(a) Nucleophile is a Lewis acid

(b) Ammonia is a nucleophile

(c) Nucleophiles attack low e^- density sites

(d) Nucleophiles are not electron seeking

22. For the following

(i) I^- (ii) Cl^-

(iii) Br^-

The increasing order of nucleophilicity would be **[2007]**

(a) $I^- < Br^- < Cl^-$ (b) $Cl^- < Br^- < I^-$

(c) $I^- < Cl^- < Br^-$ (d) $Br^- < Cl^- < I^-$

23. The order of decreasing reactivity towards an electrophilic reagent, for the following

(A) Benzene (B) Toluene

(C) Chlorobenzene and (D) Phenol

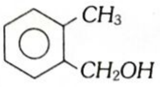
would be **[2007]**

(a) $A > B > C > D$ (b) $B > D > A > C$

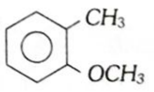
(c) $D > C > B > A$ (d) $D > B > A > C$

24. Which one of the following is most reactive towards electrophilic reagent **[2010, 11]**

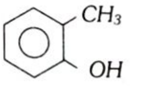
(a)



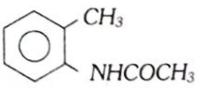
(b)



(c)



(d)



25. Which of the following species is not electrophilic in nature **[2010]**

(a) $\overset{\oplus}{Cl}$ (b) BH_3

(c) $H_3\overset{\oplus}{O}$ (d) $\overset{\oplus}{N}O_2$

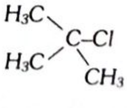
26. Among the following compounds the one that is most reactive towards electrophilic nitration is **[2012]**

(a) Benzoic Acid (b) Nitrobenzene

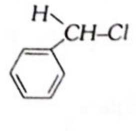
(c) Toluene (d) Benzene

27. In which of the following compounds, the $C-Cl$ bond ionisation shall give most stable carbonium ion **[2015]**

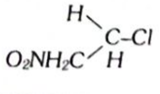
(a)



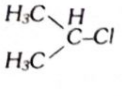
(b)



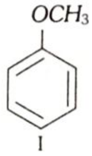
(c)



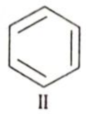
(d)



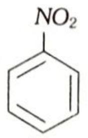
28. Among the following compounds (I-III) the correct order of reaction with electrophilic reagent is **[1997]**



I



II

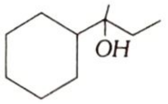


III

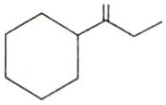
(a) II > III > I (b) III < I < II

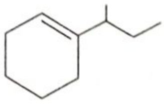
(c) I > II > III (d) I = II > III

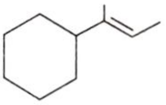
29. Which of the following is not the product of dehydration of

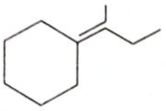


[2015]

(a) 

(b) 

(c) 

(d) 

30. The correct statement regarding electrophile is **[2017]**

(a) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from a nucleophile

(b) Electrophile is a negatively charged species and can form a bond by accepting a pair of electrons from another electrophile

(c) Electrophiles are generally neutral species and can form a bond by accepting a pair of electrons from a nucleophile

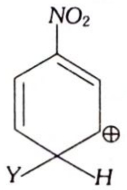
(d) Electrophile can be either neutral or positively charged species and can form a bond by accepting a pair of electrons from a nucleophile

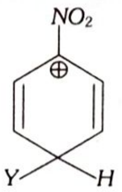
31. Which of the following is correct with respect to $-I$ effect of the substituents (R = alkyl) **[2018]**

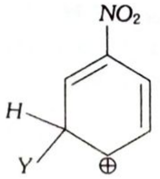
(a) $-NH_2 < -OR < -F$ (b) $-NR_2 < -OR < -F$

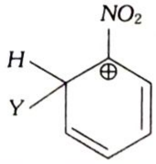
(c) $-NH_2 > -OR > -F$ (d) $-NR_2 > -OR > -F$

32. Which of the following carbocations is expected to be most stable **[2018]**

(a) 

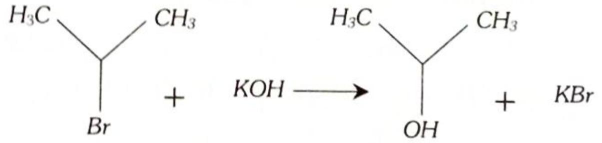
(b) 

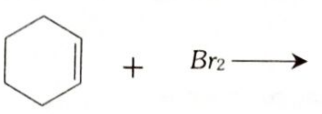
(c) 

(d) 

33. For the following reactions :

(1) $CH_3CH_2CH_2Br + KOH \rightarrow CH_3CH = CH_2 + KBr + H_2O$

(2) 

(3) 

Which of the following statements is correct

[2016]

(a) (1) and (2) are elimination reactions and (3) is addition reaction

(b) (1) is elimination, (2) is substitution and (3) is addition reaction

(c) (1) is elimination, (2) and (3) are substitution reaction

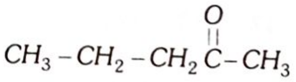
(d) (1) is substitution, (2) and (3) are addition reactions

34. Nucleophilic addition reaction will be most favoured in

[2006]

(a) CH_3CH_2CHO

(b) CH_3CHO

(c) 

$CH_3-CH_2-CH_2\overset{O}{\overset{||}{C}}-CH_3$

(d) $(CH_3)_2C = O$

35. Which of the following reactions is an example of nucleophilic substitution reaction **[2009]**

(a) $RX + KOH \rightarrow ROH + KX$

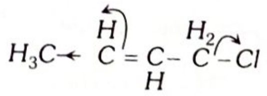
(b) $2RX + 2Na \rightarrow R-R + 2NaX$

(c) $RX + H_2 \rightarrow RH + HX$

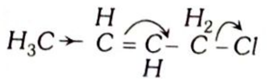
(d) $RX + Mg \rightarrow RMgX$

36. Which of the following is the most correct electron displacement for a nucleophilic reaction to take place

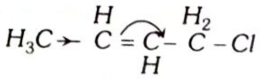
[2015]

(a) 

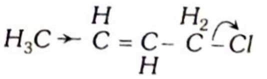
$H_3C \leftarrow \overset{H}{C} = \underset{H}{C} - \overset{H_2}{C} - Cl$

(b) 

$H_3C \rightarrow \overset{H}{C} = \underset{H}{C} - \overset{H_2}{C} - Cl$

(c) 

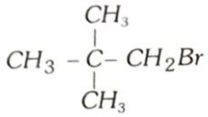
$H_3C \rightarrow \overset{H}{C} = \underset{H}{C} - \overset{H_2}{C} - Cl$

(d) 

$H_3C \rightarrow \overset{H}{C} = \underset{H}{C} - \overset{H_2}{C} - Cl$

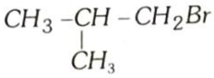
37. In a S_{N^2} substitution reaction of the type

$R-Br+Cl^- \xrightarrow{\text{DMF}} R-Cl+Br^-$ which one of the following has the highest relative rate **[2008]**

(a) 
$CH_3-\overset{CH_3}{\underset{CH_3}{C}}-CH_2Br$

(b) CH_3CH_2Br

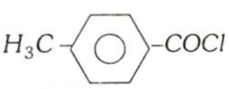
(c) $CH_3-CH_2-CH_2Br$

(d) 
$CH_3-\underset{CH_3}{CH}-CH_2Br$

38. Consider the following compounds

(i) C_6H_5COCl

(ii) 

(iii) 

(iv) 

The correct decreasing order of their reactivity towards hydrolysis is **[2007]**

(a) (ii)> (iv) > (iii) > (i)
(b) (i) > (ii) > (iii) > (iv)
(c) (iv) > (ii) > (i) > (iii)
(d) (ii) > (iv) > (i) > (iii)

39. Consider the reactions

(i) $(CH_3)_2CH-CH_2Br \xrightarrow{C_2H_5OH}$

$(CH_3)_2CH-CH_2OC_2H_5+HBr$

(ii) $(CH_3)_2CH-CH_2Br \xrightarrow{C_2H_5O^-}$

$(CH_3)_2CH-CH_2OC_2H_5+Br^-$

The mechanisms of reactions (i) and (ii) are respectively **[2011]**

(a) S_{N^2} and S_{N^2}
(b) S_{N^2} and S_{N^1}
(c) S_{N^1} and S_{N^2}
(d) S_{N^1} and S_{N^1}

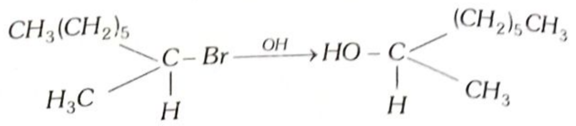
40. Which of the following undergoes nucleophilic substitution by S_{N^1} mechanism **[2005]**

(a) Benzyl chloride
(b) Ethyl chloride
(c) Chlorobenzene
(d) Isopropyl chloride

41. Which one of the following is least reactive in a nucleophilic substitution reaction **[2004]**

(a) CH_3CH_2Cl
(b) $CH_2=CHCH_2Cl$
(c) $(CH_3)_3C-Cl$
(d) $CH_2=CHCl$

42. The following reaction is described as



[1997]

(a) S_{E^2}
(b) S_{N^1}
(c) S_{N^2}
(d) S_{N^0}

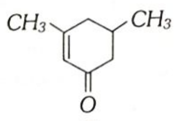
43. How many structural isomers are possible for a compound with molecular formula C_3H_7Cl **[2001]**

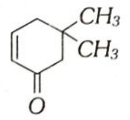
(a) 2
(b) 5
(c) 7
(d) 9

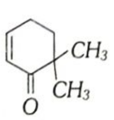
44. How many isomers of $C_5H_{11}OH$ will be primary alcohols **[1992]**

(a) 2
(b) 3
(c) 4
(d) 5

45. Given


(I)

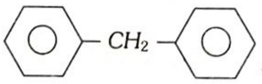

(II)


(III)

Which of the given compounds can exhibit tautomerism **[2015]**

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

46. The molecular formula of diphenyl methane,


, is $C_{13}H_{12}$

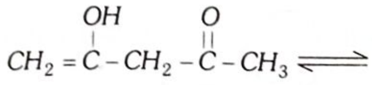
How many structural isomers are possible when one of the hydrogens is replaced by a chlorine atom **[2004]**

(a) 8
(b) 7
(c) 6
(d) 4

47. Tautomerism is exhibited by **[1997]**

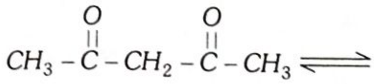
(a) $(CH_3)_3CNO$
(b) $(CH_3)_2NH$
(c) R_3CNO_2
(d) RCH_2NO_2

48. The order of stability of the following tautomeric compounds is



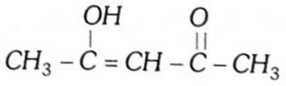
$CH_2=\overset{OH}{\overset{|}{C}}-CH_2-\overset{O}{\overset{||}{C}}-CH_3 \rightleftharpoons$

(I)



$CH_3-\overset{O}{\overset{||}{C}}-CH_2-\overset{O}{\overset{||}{C}}-CH_3 \rightleftharpoons$

(II)



$CH_3-\overset{OH}{\overset{|}{C}}=CH-\overset{O}{\overset{||}{C}}-CH_3$

(III)

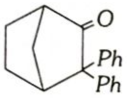
[2013]

(a) II>III>I (b) I>II>III

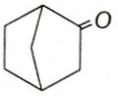
(c) III>II>I (d) II>I>III

49. Which among the given molecules can exhibit tautomerism


(I)



(II)



(III)

[2016]

(a) Both II and III (b) III only

(c) Both I and III (d) Both I and II

50. Geometrical isomerism is shown by

[1983, 1990, 1992, 2009]

(a) 2-butene (b) 2-butyne

(c) 2-butanol (d) Butanal

51. Which of the following can exhibit *cis-trans* isomerism

[1989]

(a) $HC \equiv CH$ (b) $ClCH=CHCl$

(c) $CH_3.CHCl.COOH$ (d) $ClCH_2-CH_2Cl$

52. Reason for geometrical isomerism shown by 2-butene is

[2000]

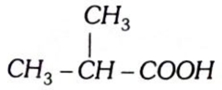
(a) Chiral carbon

(b) Free rotation about single bond

(c) Free rotation about double bond

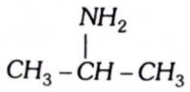
(d) Restricted rotation about double bond

53. Which of the following may exist in enantiomorphs **[1988]**

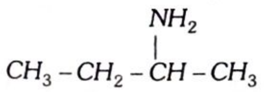
(a) 

$CH_3-\overset{CH_3}{\overset{|}{C}H}-COOH$

(b) $CH_2=CHCH_2CH_2CH_3$

(c) 

$CH_3-\overset{NH_2}{\overset{|}{C}H}-CH_3$

(d) 

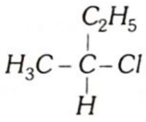
$CH_3-CH_2-\overset{NH_2}{\overset{|}{C}H}-CH_3$

54. Separating of *d* and *l* enantiomorphs from a racemic mixture is called **[1988]**

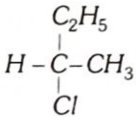
(a) Resolution (b) Dehydration

(c) Rotation (d) Dehydrohalogenation

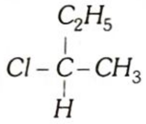
55. $CH_3-CHCl-CH_2-CH_3$ has a chiral centre. which of the following represents its *R* configurations **[2007]**

(a) 

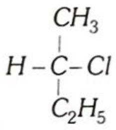
$H_3C-\underset{H}{\underset{|}{\overset{C_2H_5}{\overset{|}{C}}}}-Cl$

(b) 

$H-\underset{Cl}{\underset{|}{\overset{C_2H_5}{\overset{|}{C}}}}-CH_3$

(c) 

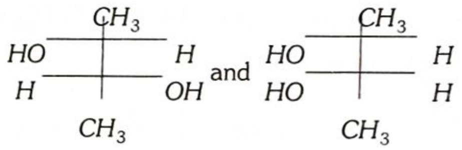
$Cl-\underset{H}{\underset{|}{\overset{C_2H_5}{\overset{|}{C}}}}-CH_3$

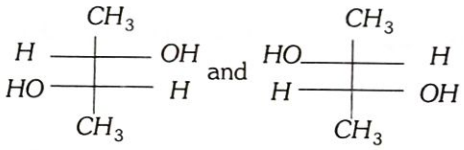
(d) 

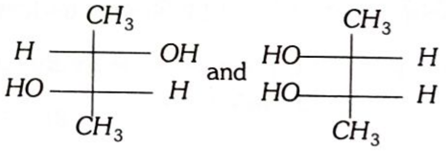
$H-\underset{C_2H_5}{\underset{|}{\overset{CH_3}{\overset{|}{C}}}}-Cl$

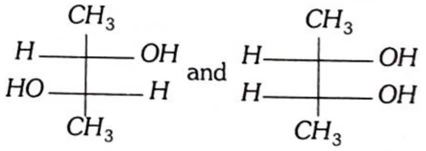
56. Which of the following pairs of compounds are enantiomers

[2003]

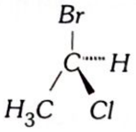
(a) 

(b) 

(c) 

(d) 

57. The chirality of the compound **[2005]**



(a) *R* (b) *S*

(c) *Z* (d) *E*

58. Which of the following is not chiral **[2006]**

(a) 3-bromopentane (b) 2-hydroxypropanoic acid

(c) 2-butanol (d) 2,3-dibromopentane

59. How many stereoisomers does this molecule have $CH_3CH=CHCH_2CHBrCH_3$ **[2008]**

(a) 8 (b) 2

(c) 4 (d) 6

60. If there is no rotation of plane polarized light by a compound in a specific solvent, thought to be chiral, it may mean that **[2007]**

(a) The compound is certainly a chiral

(b) The compound is certainly meso

(c) There is no compound in the solvent

(d) The compound may be a racemic mixture

61. Which of the following acids does not exhibit optical isomerism **[2012]**

(a) Maleic acid (b) α-amino acids

(c) Lactic acid (d) Tartaric acid

62. Two possible stereo-structures of $CH_3CHOH.COOH$, which are optically active, are called **[2015]**

(a) Diastereomers (b) Atropisomers

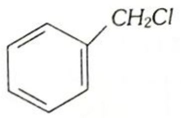
(c) Enantiomers (d) Mesomers

63. In the reaction $CH_3CHO+HCN \rightarrow CH_3CH(OH)CN$ a chiral centre is produced. This product would be **[1995]**

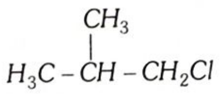
(a) Laevorotatory (b) Meso compound

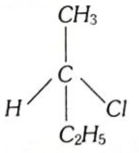
(c) Dextrorotatory (d) Racemic mixture

64. Which of the following compounds will undergo racemisation when solution of KOH hydrolyse **[2014]**

(i) 

(ii) $CH_3CH_2CH_2Cl$

(iii) 
$H_3C-\overset{\overset{\displaystyle CH_3}{|}}{C}H-CH_2Cl$

(iv) 

(a) (iii) and (iv) (b) (i) and (iv)

(c) Only (iv) (d) (ii) and (iv)

65. In an S_{N^1} reaction on chiral centres, there is **[2015]**

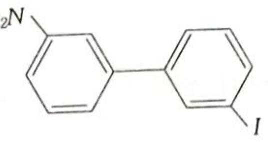
(a) 100% racemization

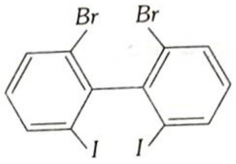
(b) Inversion more than retention leading to partial racemization

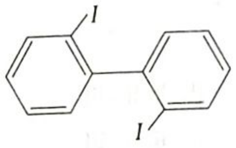
(c) 100% retention

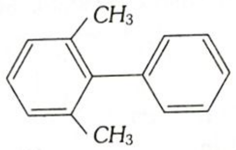
(d) 100% inversion

66. Which of the following biphenyls is optically active **[2016]**

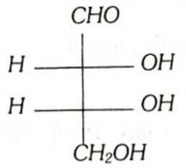
(a) 

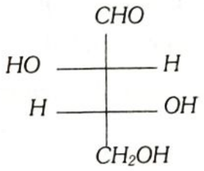
(b) 

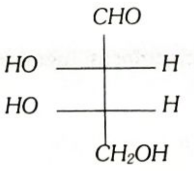
(c) 

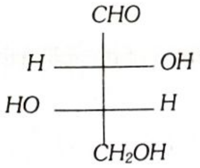
(d) 

67. The correct corresponding order of names of four aldoses with configuration given below









respectively, is **[2016]**

(a) D-erythrose, D-threose, L-erythrose, L-threose

(b) L-erythrose, L-threose, L-erythrose, D-threose

(c) D-threose, D-erythrose, L-threose, L-erythrose

(d) L-erythrose, L-threose, D-erythrose, D-threose

7. AIIMS

1. The number of σ and π bonds present in pent-4-ene-1-yne is **[2002]**

(a) 10, 3 (b) 3, 10

(c) 4, 9 (d) 9, 4

2. $C–C$ bond length in benzene is **[2001]**

(a) 1.39 Å

(b) 1.54 Å

(c) 1.34 Å

(d) Different in different bonds

3. The dipole moment is the highest for **[2004]**

(a) *Trans*-2-butene (b) 1, 3-dimethylbenzene

(c) Acetophenone (d) Ethanol

4. Among the given cations, the most stable carbonium ion is **[1985, 2001]**

(a) *Sec*-butyl (b) *Ter*-butyl

(c) *n*-butyl (d) None of these

5. In a reaction of C_6H_5Y, the major product (> 60%) is *m*-isomer, so the group *Y* is **[1997]**

(a) $-COOH$ (b) $-NH_2$

(c) $-OH$ (d) $-Cl$

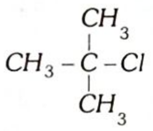
6. The compound which is not reactive towards electrophilic substitution is **[2005]**

(a) Nitro benzene (b) Aniline

(c) Phenol (d) *N*-acetyl aniline

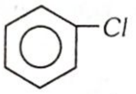
7. Which is least reactive towards nucleophilic substitution (S_{N^2}) **[2006]**

(a) $CH_2=CH-CH_2Cl$ (b)



$CH_3-\underset{CH_3}{\overset{CH_3}{\underset{|}{\overset{|}{C}}}}-Cl$

(c)

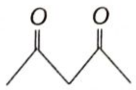


(d) $CH_3-CH(Cl)CH_3$

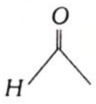
8. Maximum enol content is in **[2008]**

(a)

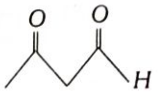
(b)



(c)

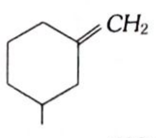


(d)

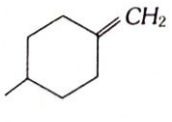


9. The geometrical isomerism is shown by **[2004]**

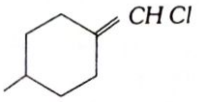
(a)



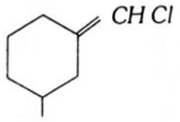
(b)



(c)

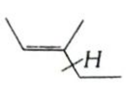


(d)

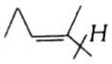


10. C_8H_{16} that can form *cis – trans* geometrical isomers and also has a chiral centre, is **[2008]**

(a)



(b)



(c) Both of these (d) None of these

11. Among the following the most stable compound is **[2005]**

(a) *cis* –1,2 – cyclohexanediol

(b) *trans* –1,2 – cyclohexanediol

(c) *cis* –1,3 – cyclohexanediol

(d) *trans* –1,3 – cyclohexanediol

12. Meso-tartaric acid is optically inactive due to the presence of **[1982]**

(a) Molecular symmetry (b) Molecular asymmetry

(c) External compensation (d) Two asymmetric C-atoms

13. Which of the following compounds is an optically active compound **[1992]**

(a) 1-butanol (b) 2-butanol

(c) 3-butanol (d) 4-heptanol

14. Which of the following is a chiral compound **[2002]**

(a) Hexane (b) Methane

(c) *n*-butane (d) 2,3,4-trimethyl hexane

15. The number of enantiomers of the compound $CH_3CHBrCHBrCOOH$ is **[1997]**

(a) 0 (b) 1

(c) 3 (d) 4

16. Among the following which one can have a meso form **[2006]**

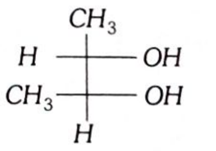
(a) $CH_3CH(OH)CH(Cl)C_2H_5$

(b) $CH_3CH(OH)CH(OH)CH_3$

(c) $C_2H_5CH(OH)CH(OH)CH_3$

(d) $HOCH_2CH(Cl)CH_3$

17. Correct configuration of the following is **[2005]**



(a) 1S, 2S (b) 1S, 2R

(c) 1R, 2S (d) 1R, 2R

18. Which one of the following pairs represents stereoisomerism **[1992]**

(a) Chain isomerism and rotational isomerism

(b) Structural isomerism and geometric isomerism

(c) Linkage isomerism and geometric isomerism

(d) Optical isomerism and geometric isomerism

19. The type of isomerism observed in urea molecule is

[2007]

(a) Chain
(b) Position
(c) Geometrical
(d) Tautomerism

8. Assertion and Reason

Read the assertion and reason carefully to mark the correct option out of the options given below:

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) If assertion is true but reason is false.

(d) If the assertion and reason both are false.

(e) If assertion is false but reason is true.

1. Assertion : Aniline is better nucleophile than anilium ion.

Reason : Anilium ion have +*ve* charge.

[AIIMS 1996]

2. Assertion : Neopentane forms one mono substituted compound.

Reason : Neopentane is isomer of pentane.

[AIIMS 2001]

3. Assertion : *Trans*-2-butene on reaction with Br_2 gives *meso*-2, 3-dibromobutane.

Reason : The reaction involves syn-addition of bromine. **[AIIMS 2003]**

4. Assertion : Benzyl bromide when kept in acetone water it produces benzyl alcohol.

Reason : The reaction follows S_{N2} mechanism.

[AIIMS 2003, 15]

5. Assertion : Boiling points of *cis* – isomers are higher than *trans* – isomers.

Reason : Dipole moments of *cis* – isomers are higher than *trans* – isomers. **[AIIMS 2008]**

6. Assertion : Diastereoisomers have different physical properties.

Reason : They are non-superimposable mirror images. **[AIIMS 2006]**

7. Assertion : The presence of nitro group facilitates nucleophilic substitution reactions in aryl halides.

Reason : The intermediate carbanion is stabilized due to the presence of nitro group.

[AIIMS 2006]

8. Assertion : All the hydrogen atoms in $CH_2 = C = CH_2$ lie in one plane.

Reason : All the carbon atoms in it are sp^2 hybridized.

14. General Organic Chemistry – Answers Keys

1. Bonding and Hybridisation in Organic Compounds

1	b	2	c	3	c	4	c	5	a
6	c	7	b	8	a	9	a	10	c
11	c	12	c	13	d	14	c	15	d
16	b	17	b						

2. Dipole Moment, Resonance and Reaction Intermediates

1	a	2	d	3	e	4	d	5	a
6	a	7	b	8	a	9	b	10	b
11	a	12	d	13	d	14	d	15	b
16	a	17	a	18	b	19	c	20	c
21	d	22	c	23	a	24	c	25	d
26	b	27	d	28	b	29	d	30	c
31	b	32	b	33	b	34	b		

3. Organic Reactions and their Mechanism

1	c	2	b	3	a	4	d	5	b
6	c	7	d	8	c	9	a	10	c
11	d	12	d	13	a	14	c	15	c
16	b	17	a	18	d	19	d	20	d
21	a	22	b	23	c	24	c	25	b
26	d	27	a	28	b	29	b	30	c
31	a	32	a	33	b	34	b	35	c

4. Structural and Stereo Isomerism

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

5. IIT-JEE/ AIEEE

1	c	2	a	3	b	4	b	5	c
6	c	7	a	8	b	9	a	10	b
11	b	12	b	13	b	14	d	15	d
16	b	17	d	18	a	19	b	20	a
21	c	22	c	23	d	24	c	25	b
26	c	27	d	28	d	29	a	30	b
31	a	32	c	33	c	34	b	35	a
36	c	37	b	38	d	39	a	40	b
41	b	42	d	43	b	44	a	45	a
46	d	47	b	48	a	49	a	50	a
51	d	52	d	53	c	54	a	55	c
56	a	57	d	58	a	59	c	60	a
61	c	62	b	63	d	64	a	65	c
66	b	67	c	68	d	69	b	70	a

71	b	**72**	d	**73**	a	**74**	b	**75**	d
76	c	**77**	b	**78**	b	**79**	d		

6. NEET/ AIPMT/ CBSE-PMT

1	a	**2**	d	**3**	a	**4**	a	**5**	c
6	b	**7**	a	**8**	c	**9**	d	**10**	d
11	c	**12**	b	**13**	c	**14**	c	**15**	c
16	a	**17**	b	**18**	b	**19**	b	**20**	c
21	a	**22**	b	**23**	d	**24**	c	**25**	c
26	c	**27**	a	**28**	c	**29**	b	**30**	d
31	ab	**32**	c	**33**	b	**34**	b	**35**	a
36	b	**37**	b	**38**	d	**39**	c	**40**	a
41	d	**42**	c	**43**	a	**44**	c	**45**	c
46	d	**47**	d	**48**	c	**49**	b	**50**	a
51	b	**52**	d	**53**	d	**54**	a	**55**	c
56	b	**57**	a	**58**	a	**59**	c	**60**	d
61	a	**62**	c	**63**	d	**64**	c	**65**	b
66	b	**67**	a						

7. AIIMS

1	a	**2**	a	**3**	c	**4**	b	**5**	a
6	a	**7**	c	**8**	b	**9**	d	**10**	a
11	d	**12**	a	**13**	b	**14**	d	**15**	d
16	b	**17**	a	**18**	d	**19**	d		

8. Assertion & Reason

1	a	**2**	b	**3**	c	**4**	a	**5**	a
6	c	**7**	a	**8**	d				