CHAPTER 12

Organic Chemistry-Some Basic Principles & Techniques

1. 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) $(CH_3)_3 - C - < CH_3 - CH_2 - < (CH_3)_2 - CH -$

2. 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.

3. 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

4. The functional group, which is found in amino acid is **[2002]**

(a) – COOH group (b) $-NH_2$ group

(c) $-CH_3$ group (d) both (a) and (b).

5. Which of the following compounds has wrong IUPAC name? **[2002]**

(a) $CH_3-CH_2-CH_2-COO-CH_2CH_3 \rightarrow$ ethyl butanoate

(b) $CH_3 - \underset{\underset{CH}{|}}{C}H - CH_2 - CHO \rightarrow$ 3-methyl-butanal

(c) $CH_3 - \underset{\underset{OH}{|}}{C}H - \underset{\underset{CH_3}{|}}{C}H - CH_3 \rightarrow$ 2-methyl-3-butanol

(d) $CH_3 - \underset{\underset{CH_3}{|}}{C}H - \overset{\overset{O}{||}}{C} - CH_2 - CH_3 \rightarrow$ 2-methyl-3-pentanone

6. The IUPAC name of $CH_3COCH(CH_3)_2$ is **[2003]**

(a) 2-methyl-3-butanone

(b) 4-methylisopropyl ketone

(c) 3-methyl-2-butanone

(d) Isopropylmethyl ketone

7. 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) $CH_2=\underline{C}H-CH_3$

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

(a) isomeric compounds

(b) chiral compounds

(c) meso compounds

(d) enantiomers with chiral carbon.

9. Following types of compounds (as I, II) **[2002]**

$CH_3CH = CHCH_3$ CH_3CHOH with CH_2CH_3 as a branch

are studied in terms of isomerism in:

(a) chain isomerism

(b) position isomerism

(c) conformers

(d) stereoisomerism

10. The reaction: **[2002]**

$(CH_3)_3C-Br \xrightarrow{H_2O} (CH_3)_3-C-OH$

(a) elimination reaction

(b) substitution reaction

(c) free radical reaction

(d) displacement reaction.

11. In the anion $HCOO^-$ the two carbon-oxygen bonds are found to be of equal length. what is the reason for it ? **[2003]**

(a) The C = O bond is weaker than the C — O bond

(b) The anion $HCOO^-$ has two resonating structures

(c) The anion is obtained by removal of a proton from the acid molecule

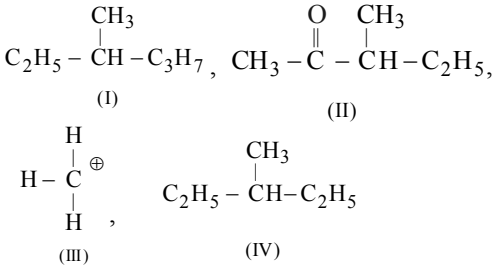
(d) Electronic orbitals of carbon atom are hybridised

12. The general formula $C_nH_{2n}O_2$ could be for open chain **[2003]**

(a) carboxylic acids (b) diols

(c) dialdehydes (d) diketones

13. Among the following four structures I to IV, **[2003]**



(I) (II)

(III) (IV)

it is true that

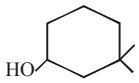
(a) only I and II are chiral compounds

(b) only III is a chiral compound

(c) only II and IV are chiral compounds

(d) all four are chiral compounds

14. The IUPAC name of the compound is



(a) 3, 3-dimethyl - 1- cyclohexanol **[2004]**

(b) 1, 1-dimethyl-3-hydroxy cyclohexane

(c) 3, 3-dimethyl-1-hydroxy cyclohexane

(d) 1, 1-dimethyl-3-cyclohexanol

15. Which one of the following does not have sp^2 hybridized carbon ? **[2004]**

(a) Acetonitrile (b) Acetic acid

(c) Acetone (d) Acetamide

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

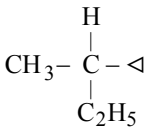
(a) 2, 3- Dichloropentane

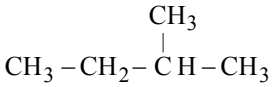
(b) 2, 3-Dichlorobutane

(c) 2-Chlorobutane

(d) 2-Hydroxypropanoic acid

17. Amongst the following compounds, the optically active alkane having lowest molecular mass is **[2004]**

(a) 

(b) 

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

(d) $CH_3-CH_2-C\equiv CH$

18. Consider the acidity of the carboxylic acids :

(a) PhCOOH

(b) o-$NO_2C_6H_4COOH$

(c) p-$NO_2C_6H_4COOH$

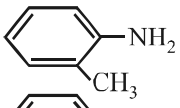
(d) m-$NO_2C_6H_4COOH$

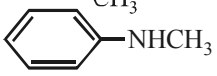
Which of the following order is correct? **[2004]**

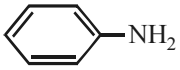
(a) 2 > 4 > 1 > 3 (b) 2 > 4 > 3 > 1

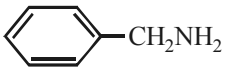
(c) 1 > 2 > 3 > 4 (d) 2 > 3 > 4 > 1

19. Which of the following is the strongest base ? **[2004]**

(a) 

(b) 

(c) 

(d) 

20. Which of the following compounds is not chiral?

(a) 1-chloro-2-methyl pentane **[2004]**

(b) 2-chloropentane

(c) 1-chloropentane

(d) 3-chloro-2-methyl pentane

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

(a) cations

(b) anions

(c) chemically inactive

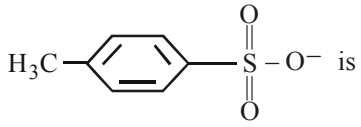
(d) chemically reactive

22. The decreasing order of nucleophilicity among the nucleophiles **[2005]**

(A) $CH_3C(=O)-O^-$

(B) CH_3O^-

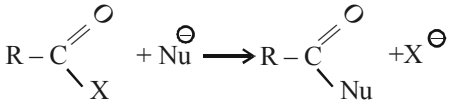
(C) CN^-

(D)  is

(a) (C), (B), (A), (D) (b) (B), (C), (A), (D)

(c) (D), (C), (B), (A) (d) (A), (B), (C), (D)

23. The reaction **[2004, 2005]**



is fastest when X is

(a) OCOR (b) OC_2H_5

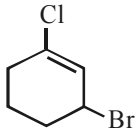
(c) NH_2 (d) Cl

24. Which types of isomerism is shown by 2, 3-dichlorobutane?

(a) Structural (b) Geometric **[2005]**

(c) Optical (d) Diastereo

25. The IUPAC name of the compound shown below is :



(a) 3-bromo-1-chlorocyclohexene **[2006]**

(b) 1-bromo-3-chlorocyclohexene

(c) 2-bromo-6-chlorocyclohex-1-ene

(d) 6-bromo-2-chlorocyclohexene

26. The increasing order of stability of the following free radicals is **[2006]**

(a) $(C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C} < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$

(b) $(CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C}$

(c) $(CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C}$

(d) $(C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$

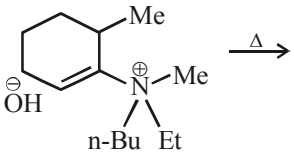
27. $CH_3Br + Nu^- \longrightarrow CH_3 - Nu + Br^-$

The decreasing order of the rate of the above reaction with nucleophiles (Nu^-) A to D is **[2006]**

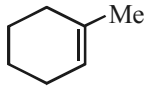
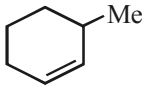
[Nu^- = (A) PhO^-, (B) AcO^-, (C) HO^-, (D) CH_3O^-]

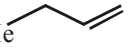
(a) A > B > C > D (b) B > D > C > A

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

28. 

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

(a)  (b) 

(c)  (d) $CH_2=CH_2$

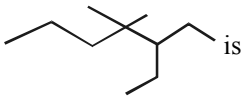
29. Increasing order of stability among the three main conformations (i.e. Eclipse, Anti, Gauche) of 2-fluoroethanol is **[2006]**

(a) Eclipse, Anti, Gauche

(b) Anti, Gauche, Eclipse

(c) Eclipse, Gauche, Anti

(d) Gauche, Eclipse, Anti

30. The IUPAC name of  is

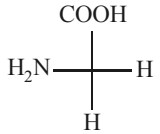
(a) 3-ethyl-4-4-dimethylheptane **[2007]**

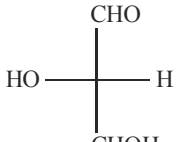
(b) 1, 1-diethyl-2,2-dimethylpentane

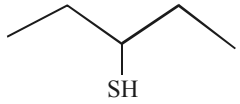
(c) 4, 4-dimethyl-5,5-diethylpentane

(d) 5, 5-diethyl-4,4-dimethylpentane.

31. Which of the following molecules is expected to rotate the plane of plane-polarised light? **[2007]**

(a) 

(b) 

(c) 

(d) 

32. Presence of a nitro group in a benzene ring **[2007]**

(a) deactivates the ring towards electrophilic substitution

(b) activates the ring towards electrophilic substitution

(c) renders the ring basic

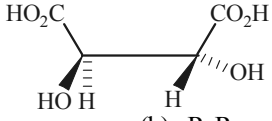
(d) deactivates the ring towards nucleophilic substitution.

33. Which one of the following conformations of cyclohexane is chiral? **[2007]**

(a) Boat (b) Twist boat

(c) Rigid (d) Chair.

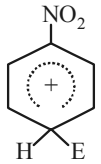
34. The absolute configuration of **[2008]**

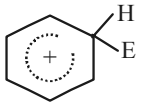


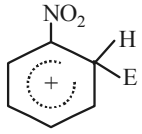
(a) S, S (b) R, R

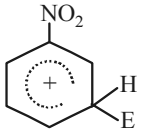
(b) R, S (c) S, R

35. The electrophile, $E^{\oplus}$ attacks the benzene ring to generate the intermediate σ–complex. Of the following, which σ–complex is lowest energy? **[2008]**

(a) 

(b) 

(c) 

(d) 

36. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is **[2008]**

(a) $-COOH, -SO_3H, -CONH_2, -CHO$

(b) $-SO_3H, -COOH, -CONH_2, -CHO$

(c) $-CHO, -COOH, -SO_3H, -CONH_2$

(d) $-CONH_2, -CHO, -SO_3H, -COOH$

37. The IUPAC name of neopentane is **[2009]**

(a) 2, 2 dimethylpropane

(b) 2 methylpropane

(c) 2, 2 dimethylbutane

(d) 2- methylbutane

38. Arrange the carbanions, **[2009]**

$(CH_3)_3\bar{C}, \bar{C}Cl_3, (CH_3)_2\bar{C}H, C_6H_5\bar{C}H_2$

in order of their decreasing stability :

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

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

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

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

39. The alkene that exhibits geometrical isomerism is:

(a) 2- methyl propene **[2009]**

(b) 2-butene

(c) 2- methyl -2- butene

(d) propene

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

(b) 2 (c) 4

(d) 6 (d) 3

41. The correct order of increasing basicity of the given conjugate bases (R = CH_3) is **[2010]**

(a) $R\bar{C}OO < HC \equiv \bar{C} < \bar{R} < \bar{N}H_2$

(b) $\bar{R} < HC \equiv \bar{C} < R\bar{C}OO < \bar{N}H_2$

(c) $R\bar{C}OO < \bar{N}H_2 < HC \equiv \bar{C} < \bar{R}$

(d) $R\bar{C}OO < HC \equiv \bar{C} < \bar{N}H_2 < \bar{R}$

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

(a) 3-methyl-2-pentene

(b) 4-methyl-1-pentene

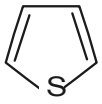
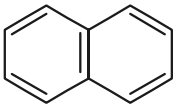
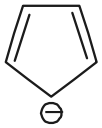
(c) 3-methyl-1-pentene

(d) 2-methyl-2-pentene

43. The change in the optical rotation of freshly prepared solution of glucose is known as: **[2011RS]**

(a) racemisation (b) specific rotation
(c) mutarotation (d) tautomerism

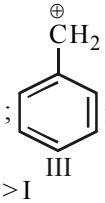
44. The non aromatic compound among the following is : **[2011RS]**

(a) 
(b) 
(c) 
(d) 

45. A solution of (–) – 1 – chloro –1– phenylethane in toluene racemises slowly in the presence of a small amount of $SbCl_5$, due to the formation of: **[2013]**

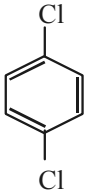
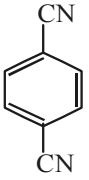
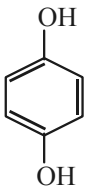
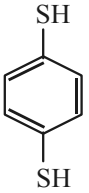
(a) carbanion (b) carbene
(c) carbocation (d) free radical

46. The order of stability of the following carbocations : **[2013]**

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

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

47. For which of the following molecule significant $\mu \neq 0$?

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

[2014]

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

48. Which of the following compounds will exhibit geometrical isomerism ? **[JEE M 2015]**

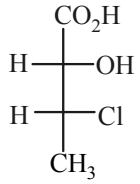
(a) 2 - Phenyl -1 - butene
(b) 1, 1 - Diphenyl - 1 - propene
(c) 1 - Phenyl - 2 - butene
(d) 3 - Phenyl -1 - butene

49. In Carius method of estimation of halogens, 250 mg of an organic compound gave 141 mg of AgBr. The percentage of bromine in the compound is : **[JEE M 2015]**

(at. mass Ag = 108; Br = 80)

(a) 48 (b) 60
(c) 24 (d) 36

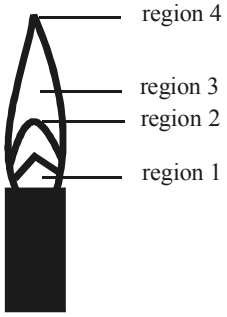
50. The absolute configuration of **[JEE M 2016]**



is :

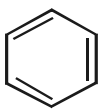
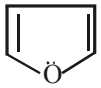
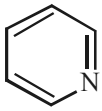
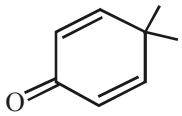
(a) (2S, 3S) (b) (2R, 3R)
(c) (2R, 3S) (d) (2S, 3R)

51. The hottest region of Bunsen flame shown in the figure below is : **[JEE M 2016]**



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

52. Which of the following molecules is least resonance stabilized? **[JEE M 2017]**

(a) 
(b) 
(c) 
(d) 

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

SOLUTIONS

1. **(b)** $-CH_3$ group has +I effect, as number of $-CH_3$ group increases, the inductive effect increases.

Therefore the correct order is

$CH_3-CH_2-<(CH_3)_2-CH-<(CH_3)_3C-$

2. **(c)** Sterioisomerism involve those isomers which contain same ligands in their co-ordination spheres but differ in the arrangement of these ligands in space. Stereo-isomerism is of two type geomerical isomerism and optical isomerism. In geomerical isomerism ligands occupy different positions around the central metal atom or ion.

NOTE In optical isomerism isomers have same formula but differ in their ability to rotate directions of the plane of polarised light.

3. **(c)** $\begin{matrix}Cl\\Cl\end{matrix}\!\!\diagdown\!\!\diagup C=CH-CH_2-CH_2CH_3$ does

not show geometrical isomerism due to presence of two similar Cl atoms on the same C-atom. Geometrical isomerism is shown by compounds in which the groups/ atoms attached to C = C are different.

4. **(d)** Amino acids contain $-NH_2$ and $-COOH$ groups e.g Glycine $CH_2\begin{matrix}NH_2\\COOH\end{matrix}$

5. **(c)** The correct name is 3 - methylbut - 2 - ol

6. **(c)** $\overset{1}{C}H_3-\overset{2}{\overset{O}{\overset{||}{C}}}-\overset{3}{\overset{CH_3}{\overset{|}{C}}}H-\overset{4}{C}H_3$;

3- methyl-2-butanone

7. **(b)** In molecules (a), (c) and (d), the carbon atom has a multiple bond, only (b) has sp^3 hybridization.

8. **(d)** A mixture of equal amount of two enantiomers is called a racemic mixture. A racemic mixture does not rotate plane–polarized light. They are optically inactive because for every molecule in a racemic mixture that rotate plane of polarized light in one direction, there is a mirror image molecule that rotates the plane in opposite direction.

9. **(d)** **TIPS / Formulae**

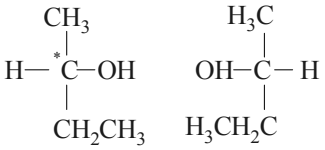
Stereoisomerism is of two types i.e., geometrical isomerism and optical isomerism

Both the structures shows sterioisomerism. Structure I shows geometrical isomerism as it contains two different atoms(H) and groups (CH_3) attached to each carbon containing double bond.

$\begin{matrix}H_3C\\H\end{matrix}\!\!\diagdown\!\!\diagup C=C\!\!\diagup\!\!\diagdown\begin{matrix}CH_3\\H\end{matrix}$ *Cis* butene

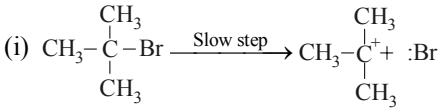
$\begin{matrix}H\\H_3C\end{matrix}\!\!\diagdown\!\!\diagup C=C\!\!\diagup\!\!\diagdown\begin{matrix}CH_3\\H\end{matrix}$ *Trans* butene

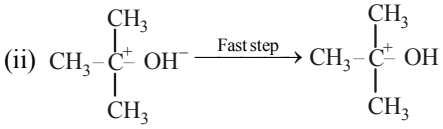
Structure II shows optical isomerism as it contains a chiral carbon (attached to four different group) atom.



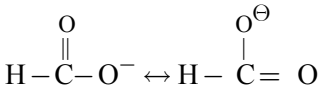
butyl alcohol (Two enantiomers)

10. (b) The hydrolysis of t-butyl bromide is an example of S_N1 reaction. The reaction consists of two steps.





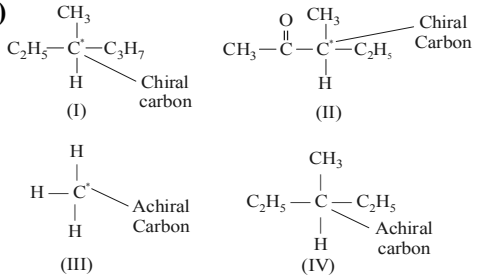
11. (d) $HCOO^-$ exists in following resonating structures



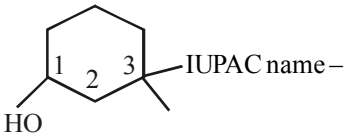
Hence in it both the carbon oxygen bonds are found equal.

12. (a) $C_nH_{2n}O_2$ is general formula for carboxylic acid

13. (a)



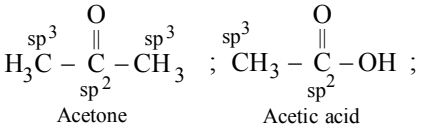
14. (a)



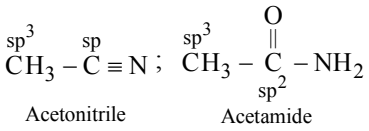
IUPAC name –

3, 3-Dimethyl -1 cyclohexanol

15. (a)

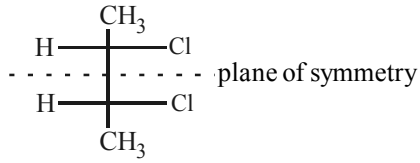


Acetone Acetic acid



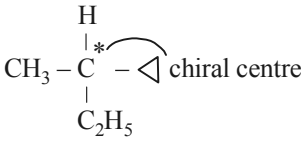
Acetonitrile Acetamide

16. (b) NOTE The compounds containing two similar assymmetric C-atoms have plane of symmetry and exist in Meso form.



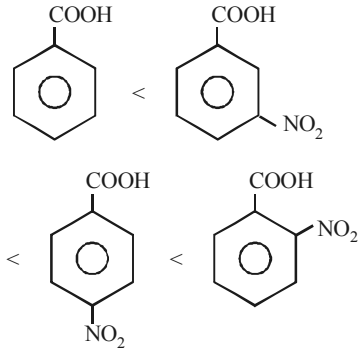
Meso 2, 3 dichlorobutane

17. (a) Only 2- cylcopropyl butane has a chiral centre.



18. (d) In aromatic acids presence of electron withdrawing substituent e.g. $-NO_2$ disperses the negative charge of the anion and stablises it and hence increases the acidity of the parent benzoic acid.

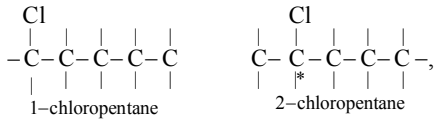
Further *o*-isomer will have higher acidity than corresponding *m* and *p* isomers. Since nitro group at *p*-position have more pronounced electron withdrawing than $-NO_2$ group at *m*-position hence the correct order is the one given above.

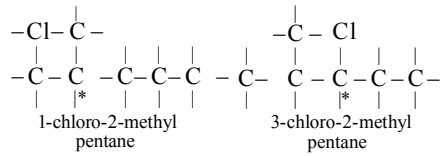


19. (d) Lone pair of electrons present on the nitrogen of benzyl amine is not involved

in resonance.

20. **(c)** 1-chloropentane is not chiral while others are chiral in nature

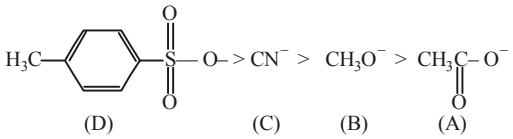




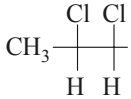
21. **(d)** Free radicals are electrically neutral, unstable and very reactive on account of the presence of odd electrons.

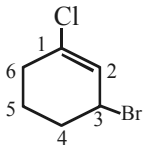
22. **(a)** In moving down a group, the basicity and nucleophilicity are inversely related, *i.e.* nucleophilicity increases while basicity decreases. In going from left to right across a period, the basicity and nucleophilicity are directly related. Both of the characteristics decrease as the electronegativity of the atom bearing lone pair of electrons increases. If the nucleophilic centre of two or more species is same, nucleophilicity parallels basicity, *i.e.* more basic the species, stronger is its nucleophilicity.

Hence based on the above facts, the correct order of nucleophilicity will be



23. **(d)** $R-\overset{O}{\overset{\|}{C}}-X$; when X is Cl the C–X bond is more polar and ionic which leaves the compound more reactive for nucleophilic substitution reaction.

24. **(c)**  . 2, 3-dichloro butane will exhibit optical isomerism due to the presence of two asymmetric carbon atom.

25. **(a)** 

3-bromo-1chlorocyclohexene

26. **(b)** The order of stability of free radicals

$$(C_6H_5)_3\dot{C} > (C_6H_5)_2\dot{C}H > (CH_3)_3\dot{C} > (CH_3)_2\dot{C}H$$

The stabilisation of first two is due to resonance and last two is due to inductive effect.

27. **(c)** **TIPS / Formulae**

The stronger the acid, the weaker the conjugate base formed.

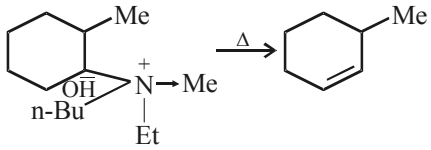
The acid character follows the order :

$$CH_3COOH > C_6H_5OH > H_2O > CH_3OH$$

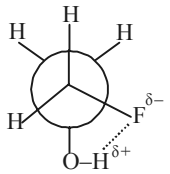
The basic character will follow the order

$$CH_3COO^- < C_6H_5O^- < O^-H < CH_3O^-$$

28. **(b)** **Hofmann's rule :** When theoretically more than one type of alkenes are possible in eliminations reaction, the alkene containing least alkylated double bond is formed as major product. Hence



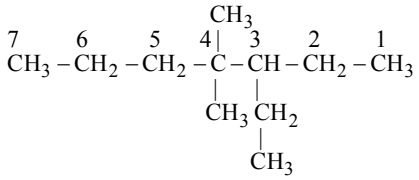
NOTE It is less stearically β-hydrogen is removed

29. **(a)** 

Due to hydrogen bonding between H & F gauche conformation is most stable hence the correct order is

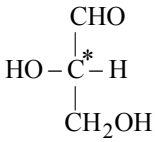
Eclipse, Anti, Gauche

30. **(a)**



3–ethyl–4,4–dimethyl heptane

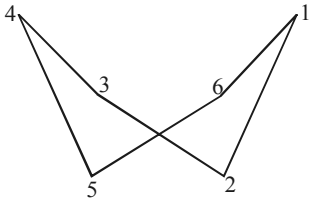
31. **(b)** NOTE The organic compounds which have chiral carbon atom (a carbon atom attached to four different group or atoms and do not have plane of symmetry rotate plane polarised light.



(* is asymmetric carbon)

32. **(a)** Nitro group is electron withdrawing group, so it deactivates the ring towards electrophilic substitution.

33. **(b)** Chiral conformation will not have plane of symmetry. Since twist boat does not have plane of symmetry it is chiral.



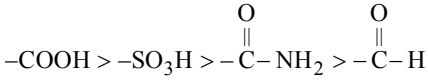
34. **(b)** The absolute configuration is (R, R) (using priority rules to get the absolute configuration)

So the correct answer is (b)

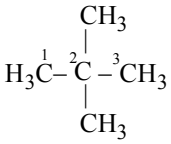
35. **(b)** In option (b) the complex formed is with benzene where as in other cases it is formed with nitrobenzene with $-NO_2$ group in different position (o-, m-, p-). The complex formed with nitrobenzene in any position of $-NO_2$ group is less stable than the complex formed with benzene so the correct answer is (b)

NOTE The most stable complex has lowest energy.

36. **(a)** The correct order of priority for the given functional group is

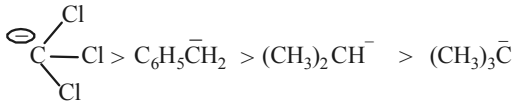


37. **(a)**



Neopentane
or 2,2- Dimethylpropane

38. **(b)**

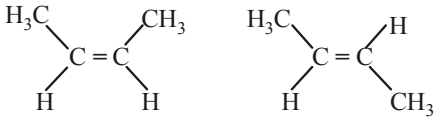


–ve charge highly dispersed due to – I effect

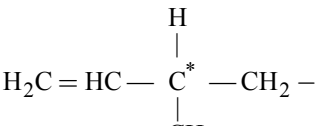
–M effect delocalises –ve charge

+I effect of CH_3 group intensifies the –ve charge

39. **(b)**



40. **(b)**



exhibits both geometrical as well as optical isomerism.

cis - R *cis* - S

trans - R *trans* - S

41. **(d)** The correct order of basicity is

$RCOO^- < CH \equiv C^- < NH_2^- < R^-$

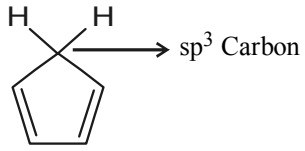
42. **(c)** For a compound to show optical isomerism, presence of chiral carbon atom is a necessary condition.

3- methyl-1-pentene

43. **(c)** When either of the two forms of glucose is dissolved in water there is change in rotation till the equilibrium value of + 52.5°. This is known as mutarotation

α–D(+)Glucose $\rightleftharpoons$ Equilibrium Mixture $\rightleftharpoons$ β–D–(+)Glucose

+111.5° +52.5° +19.5°

44. (d) 

Cyclopentadiene does not obey Huckel's Rule, as it has sp^3 carbon in the ring.

45. (c) Carbocations are planar hence can be attacked on either side to form racemic mixture.

$$Cl-\underset{\underset{(-)}{Ph}}{\underset{|}{CH}}-CH_3 \xrightarrow[Toluene]{SbCl_5} Ph-\overset{\oplus}{C}H-CH_3 + SbCl_6^- \longrightarrow$$

(carbocation)

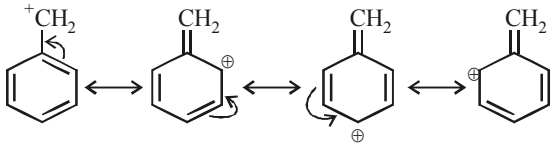
$$Ph-\underset{\underset{Cl}{|}}{CH}-CH_3 + SbCl_5$$

(d+ℓ) mixture

46. (d) Higher stability of allyl and aryl substituted methyl carbocation is due to dispersal of positive charge due to resonance

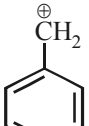
$$CH_2=CH-\overset{+}{C}H_2 \longleftrightarrow \overset{+}{C}H_2-CH=CH_2$$

Resonating structures of allyl carbocation



Resonating structures of benzyl carbocation

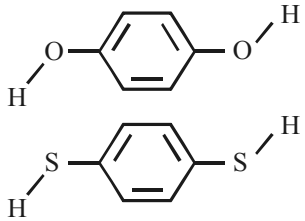
whereas in alkyl carbocations dispersal of positive charge on different hydrogen atoms is due to hyperconjugation. Hence the correct order of stability will be



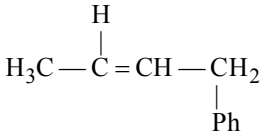
Benzyl, III

$$> CH_2=CH-\overset{\oplus}{C}H_2 > CH_3-CH_2-\overset{\oplus}{C}H_2$$

Allyl, I Propyl, II

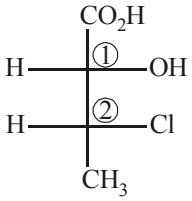
47. (d) 

In both the molecules the bond moments are not canceling with each other and hence the molecules has a resultant dipole and hence the molecule is polar.

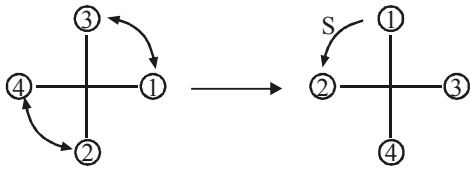
48. (c) 

1- Phenyl-2-butene the two groups around each of the doubly bonded carbon Because, all are different. This compound can show *cis*-and *trans*-isomerism.

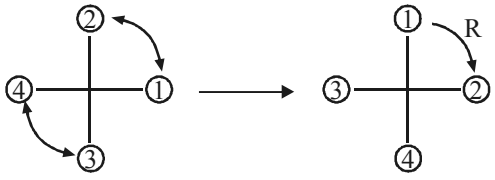
49. (c) Mass of substance = 250 mg = 0.250 g
Mass of AgBr = 141 mg = 0.141 g
1 mole of AgBr = 1 g atom of Br
188 g of AgBr = 80 g of Br
∴ 188 g of AgBr contain bromine = 80 g
0.141 g of AgBr contain bromine = $\frac{80}{188}\times 0.141$
This much amount of bromine present in 0.250 g of organic compound
∴ % of bromine = = 24%

50. (d) 

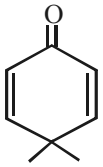
At (1),



It is 'S' configurated
At. (2),



51. (d) Region 2 (blue flame) will be the hottest region of Bunsen flame shown in given figure

52. (d) 

is nonaromatic and hence least reasonance stabilized whereas other three are aromatic.