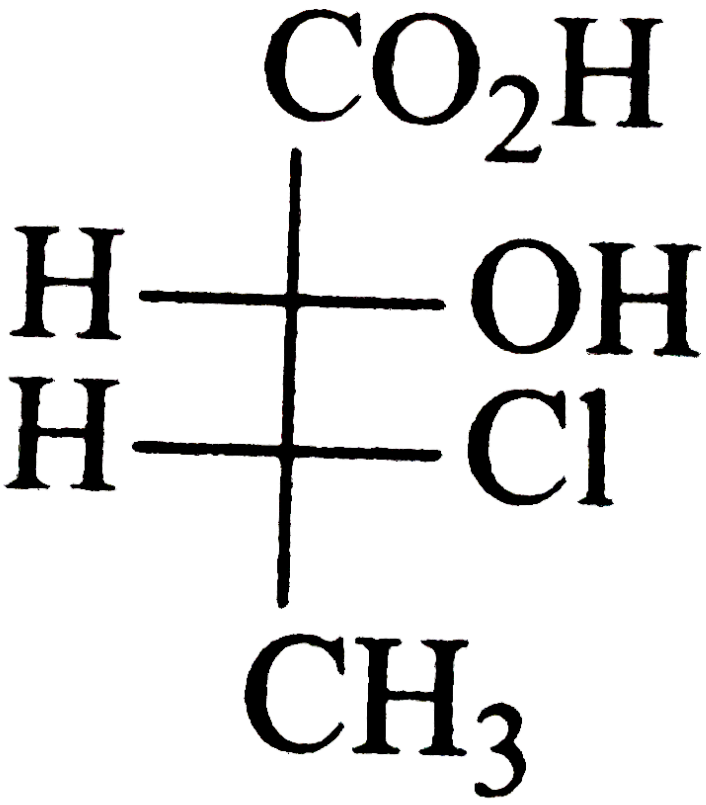
CHEMISTRY

BOOKS - IIT-JEE PREVIOUS YEAR (CHEMISTRY)

ORGANIC CHEMISTRY BASICS

Jee Main And Advanced

1. The absolute configuration of



is

A. $(2S, 3R)$

B. $(2S, 3S)$

C. $(2R, 3R)$

D. $(2R, 3S)$

Answer: A

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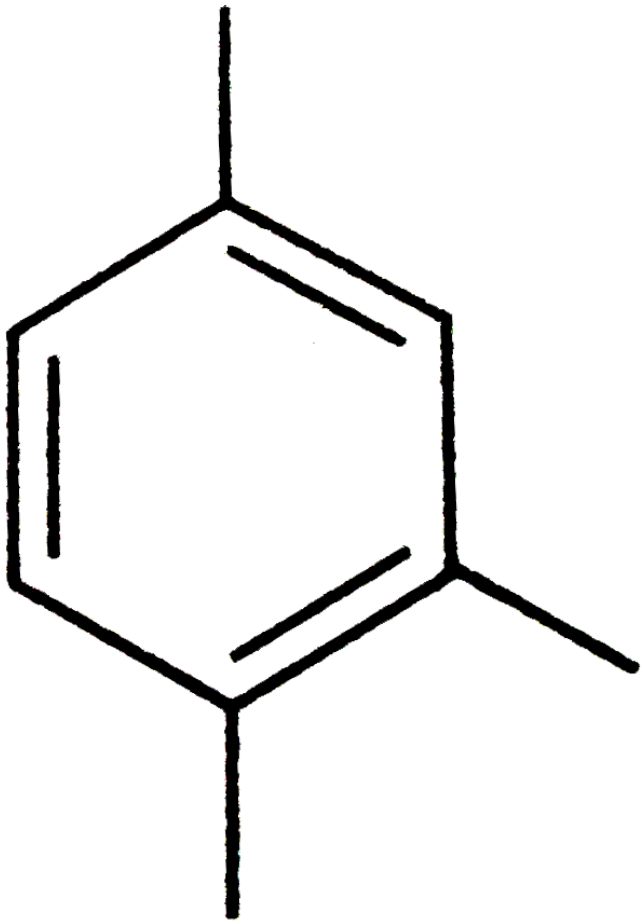
2. The IUPAC name of the following compound is



A. 4-bromo-3-cyanophenol

B. 2-bromo-5-hydroxybenzonitrile

C. 2-cyano-4-hydroxybromobenzene

D. 6-bromo-3 hydroxybenzonitrile

Answer: B

3. The number of stereoisomers obtained by bromination of trans-2-butene is

A. 1

B. 2

C. 3

D. 4

Answer: A

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4. The IUPAC name of C_6H_5COCl is

A. benzoyl chloride

B. benzene chloro ketome

C. benzene carbonyl chloride

D. chloro pheyl ketone

Answer: C

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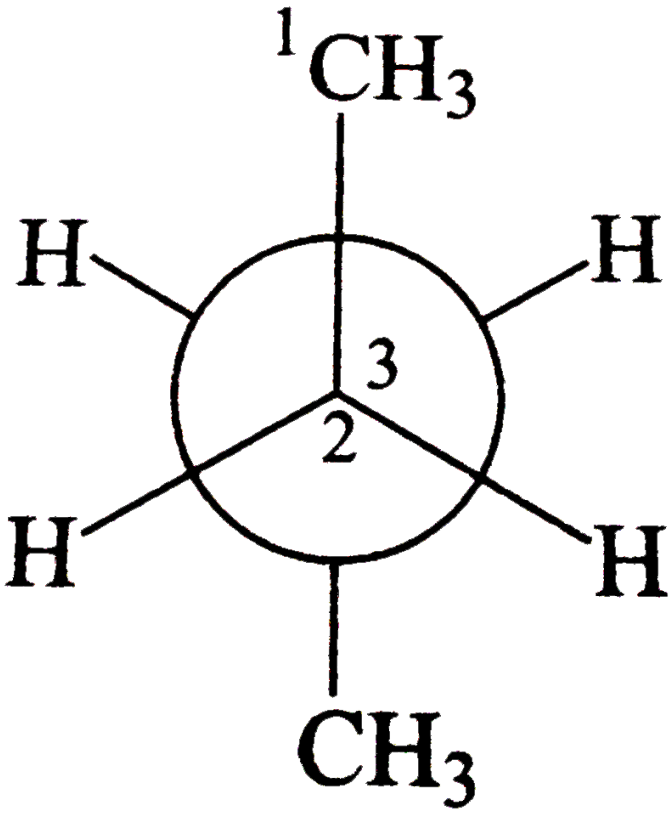
5.



C_2 is rotated anti-clockwise 120° about $C_2 - C_3$ bond. The resulting conformer is

A. partially eclipsed

B. eclipsed

C. gauche

D. staggered

Answer: C

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6. Which of the following compounds exhibits, stereoisomerism?

A. 2-methylbutene-1

B. 3-methylbutyne-1

C. 3-methylbutanoic acid

D. 2-methylbutanoic acid

Answer: D

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7. The number of isomers for the compound with molecular formula $C_2BrClFI$ is

A. 3

B. 4

C. 5

D. 6

Answer: D

8. Which of the following compounds will exhibit geometrical isomerism?

A. 1-phenyl-2 butene

B. 3-phenyl-1-butene

C. 2-phenyl-1-butene

D. 1, 1-diphenyl-1-propene

Answer: A

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9. The optically active tartaric acid is named as $D-(+)-$ tartaric acid because it has a positive

A. optical rotation and is derived from D-glucose

B. pH in organic solvent

C. optical rotation and is drived from D-(+)-glyceraldehydes

D. optical rotation when substituted by deuterium

Answer: C

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10. How many optically active stereoisomers are possible for butane-2, 3-diol ?

A. 1

B. 2

C. 3

D. 4

Answer: B

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11. Isomers which can be interconverted through rotation around a single bond are

A. conformers

B. diastereomers

C. enantiomers

D. positional isomers

Answer: A

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12. The enolic form of acetone contains

A. 9 sigma bonds, 1 pi bond and 2 lone pairs

B. 8 sigma bonds, 2 pi bonds and 2 lone pairs

C. 10 sigma bonds, 1 pi bond and 1 lone pair

D. 9 sigma bonds, 2 pi bonds and 1 lone pair

Answer: A

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13. The number of isomers of C_6H_{14} is

A. 4

B. 5

C. 6

D. 7

Answer: B

14. If two compounds have the same empirical formula but different molecular formulea, they must have

A. different percentage composition

B. different molecular weight

C. same velocity

D. same vapour density

Answer: B

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15. Which of the following will have least hindered rotation about carbon-carbon bond?

A. Ethane

B. Ethylene

C. Acetylene

D. Hexachloroethane

Answer: A

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16. Give the $IUPAC$ name of the following compound.

$CH_2 = CH - CH(CH_3)_2$

A. 1, 1-dimethyl-2 butene

B. 3-methyl-1-butene

C. 2-vinyl propane

D. None of these

Answer: B

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17. An isomer of ethanol is:

A. methanol

B. diethyl ether

C. acetone

D. dimethyl ether

Answer: D

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18. The IUPAC name of the compound having the formula is

$$H_3C - \underset{\underset{CH_3}{|}}{\overset{CH_3}{|}}{C} - CH = CH_2$$

A. 3, 3, 3-trimethyl-1-propene

B. 1, 1, 1-trimethyl-2-propene

C. 3, 3-dimethyl-1- butene

D. 2, 2-dimethyl-3-butene

Answer: C

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19. Which of the following compounds will exhibit cis-trans (geometrical) isomerism ?

A. 2-butene

B. 2-butyne

C. 2-butanol

D. butanal

Answer: A

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20. The compound which is not isomeric with diethyl ether is :

A. n-propyl methyl ether

B. butane-1-o1

C. 2-methyl propane-2-o1

D. butanone

Answer: D

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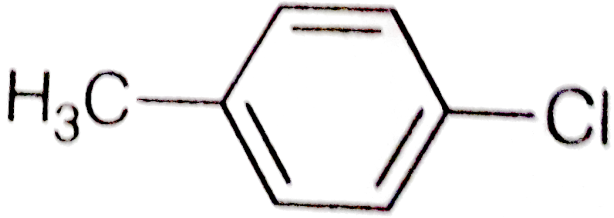
21. The IUPAC name(s) of the following compound is



(are) ltbr.

A. 4-methylchlorobenzene

B. 4-chlorotoluene

C. 1-chloro-4-methylbenzene

D. 1-methyl-4-chlorobenzene

Answer: B::C

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22. The incorrect combination of names for isomeric alcohols with molecular formula $C_4H_{10}O$ is/are

A. tert-butanol and 2-methylpropan-2-ol

B. tert-butanol and 1, 1-dimethylethan -1-ol

C. n-butanol and butan -1-ol

D. iso-butyl alcohol and 2-methylpropan-1-ol

Answer: B

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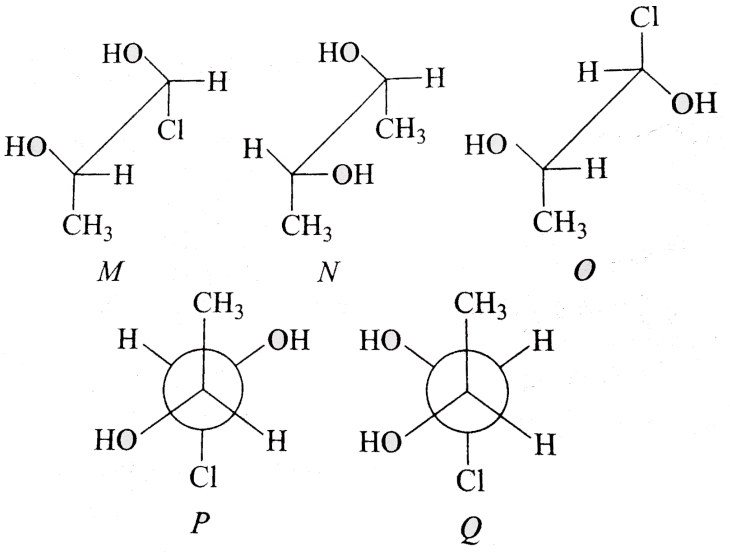
23. Which of the given statement(s) about N, O, P and Q with respect to M is/are correct?



A. M and N are non-mirror image stereoisomers

B. M and O are identical

C. M and P are enantiomers

D. M and Q are identical

Answer: A::B::C

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24. The correct statement(s) about the compound

$H_3C(HO)HC - CH = CH - CH(OH)CH_3(X)$

is/are

A. The total number of stereoisomers possible for

X is 6

B. The total number of diastereomers possible for

X is 3

C. If the stereochemistry about the double bond in X is trans, the number of enantiomers possible for X is 4

D. If the stereochemistry about the double bond in x is cis, the number of enantiomers possible for X is 2

Answer: A::D

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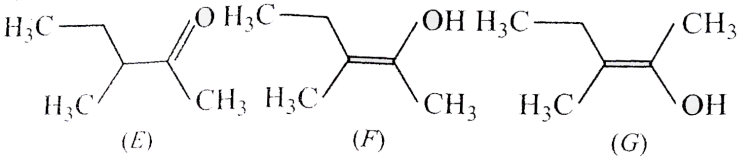
25. The correct statement(s) concerning the structures E, F and G is/are



A. E, F and G are resonance structures

B. E, F and E, g are tautomers

C. F and G are geometrical isomers

D. F and G are diastereomers

Answer: B::C::D

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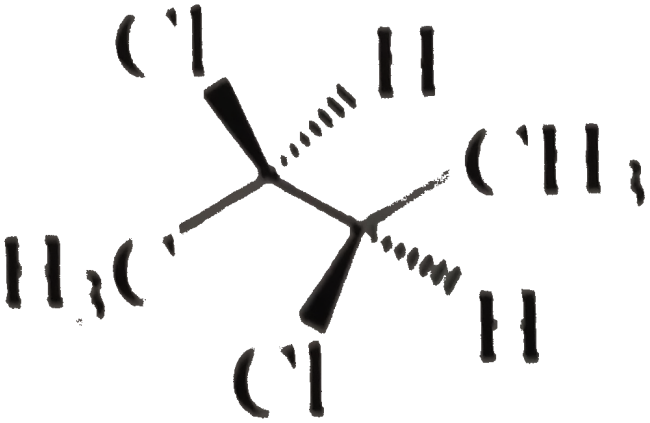
26. The correct statements (s) about the compound given below is/are:



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

Answer: A::D

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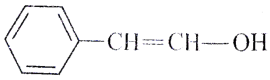
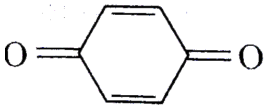
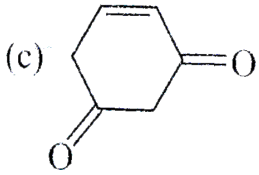
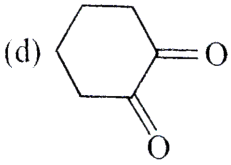
27. Tautomerism is not exhibited by

A. 

B. 

C. 

D. 

Answer: B

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28. Which of the following compounds will show geometrical isomerism?

A. 2-butene

B. propene

C. 1-phenyl propene

D. 2-methyl-2-butene

Answer: A::C

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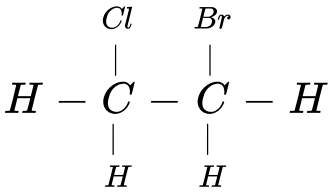
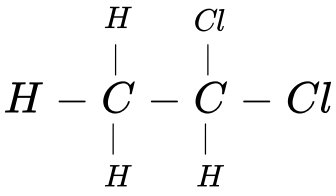
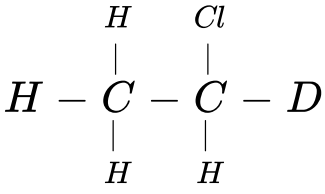
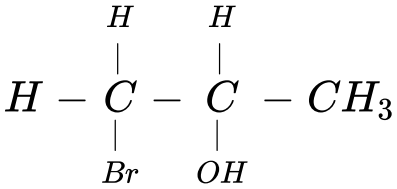
29. Which of the following has/have asymmetric carbon atom?

A. 

B. 

C. 

D. 

Answer: C::D

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30. Keto-enol tautomerism is observed in

A. $C_6H_5 - \overset{\overset{O}{||}}{C} - H$

B. $C_6H_5 - \overset{\overset{O}{||}}{C} - CH_3$

C. $C_6H_5 - \overset{\overset{O}{||}}{C} - C_6H_5$

D. $C_6H_5 - \overset{\overset{O}{||}}{C} - CH_2 - \overset{\overset{O}{||}}{C} - CH_3$

Answer: B::D

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31. Only two isomeric monochloro derivatives are possible for

A. n-butane

B. 2, 4-dimethyl pentane

C. benzene

D. 2-methyl propane

Answer: D

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32. Statement I: Molecules that are non-superimposable on their mirror images are chiral.

Statement II: All chiral molecules have chiral centres.

A. Statement I is correct, Statement II is correct, Statement II is the correct explanation of statement I.

B. Statement I is correct, Statement II is correct, Statement II is not the correct explanation of statement I.

C. Statement I is correct, Statement II is incorrect

D. Statement I is incorrect, Statement II is correct

Answer: C

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33. Isomers which are mirror images are knows as ..... (superimposable, non-superimposable, enantiomers, diastereomers, epimers)

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34. Give True or False. $2,3,4$- Trichloropentane has three asymmetric carbon atoms.

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35. Relation between m-Chloro bromobenzene and m bromo chloro benzene is.

A. Identical

B. Position Isomer

C. Functional Isomer

D. Tautomer

Answer: A

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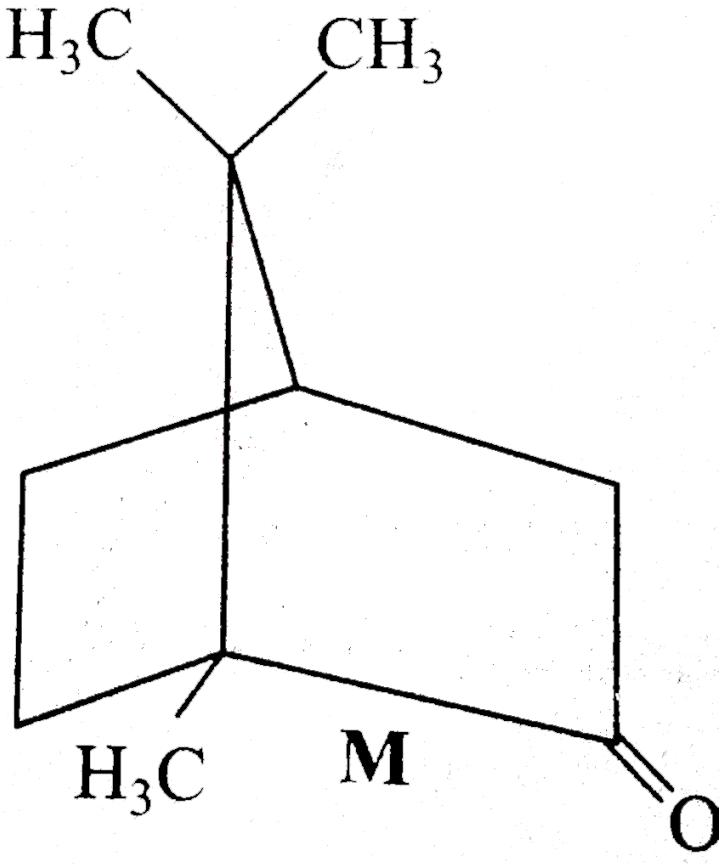
36. The total number of stereoisomers that can exist for M is



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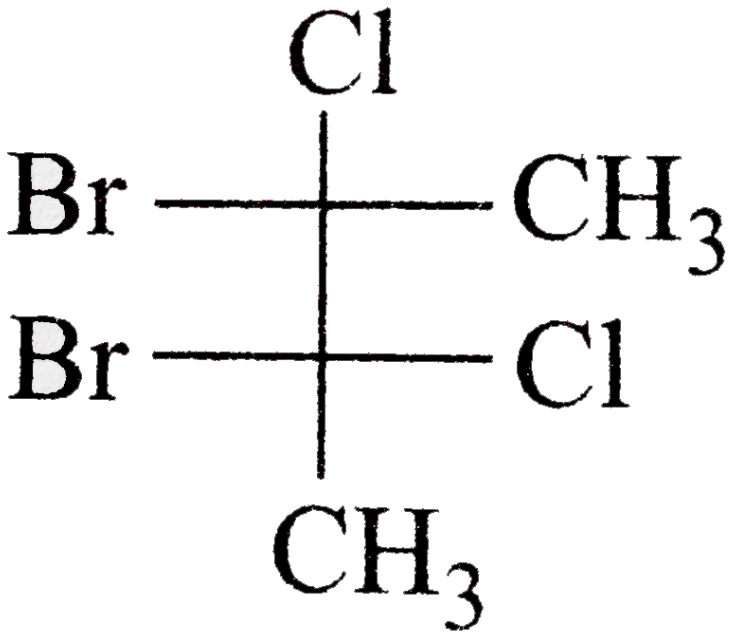
37. The total number(s) of stable conformers with non-zero diple moment for the following compound is/are



A. 1

B. 2

C. 3

D. 4

Answer: C

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38. The total number of cyclic structure as well as stereoisomers possible for a compound with the molecular formula C_5H_{10} is:

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39. μ observed $= \Sigma\mu_i X_i$

where μ_i is the dipole moment of the stable

conformer and X_i is the mole fraction of that conformer.

(a) Write the stable conformer for $(Z- -CH_2- -CH- -Z)$ in Newman's projection. If $\mu_{solution} = 1.0$ D and mole fraction of the antiform $= 0.82$, find the μ gauche form.

(b) Write the most stable meso conformer of $\begin{matrix} CHDY \\ | \\ CHDY \end{matrix}$ If (i) $Y = CH_3$ about $C_2 - C_3$ rotation and (ii) $Y = OH$, about $C_1 - C_2$ rotation.

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40. Gltcerine contain one ..... hydroxy group.

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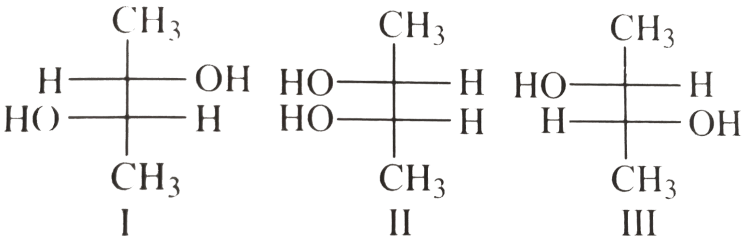
41. Identify the pairs of enantiomers and diastereomers from the following:



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42. Discuss the hybridisation of carbon atoms in allene (C_3H_4) and show the π-orbital overlap.

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43. Write tautomeric form of phenol

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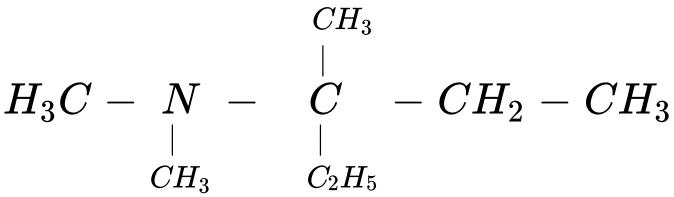
44. Write the IUPAC name of the following compound:



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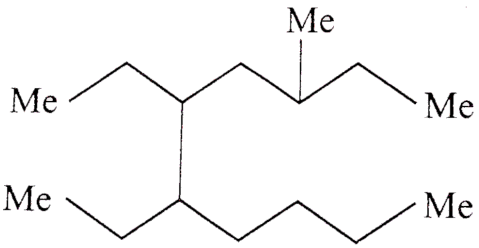
45. Given the IUPAC name of the following compound:



(Me = methyl)

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46. Write the IUPAC name of

$CH_3CH_2CH = CH - COOH.$

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47. Write the structural of all the possible isomers of dichloroethene. Which of them will have zero dipole moment?

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48. Write structural formula for all the isomeric alcohols having the molecular formula $C_4H_{10}O$.

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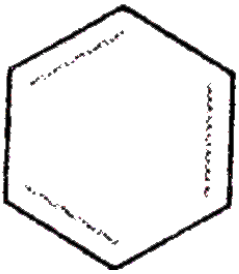
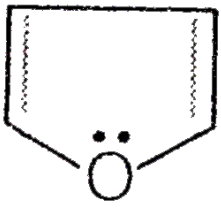
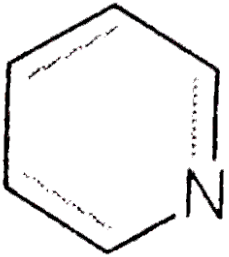
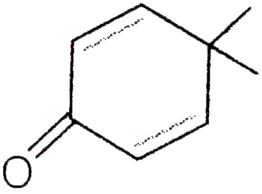
49. Which of the following molecules is least resonance stabilised?

A. 

B. 

C. 

D. 

Answer: D

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50. The distillation techique most sited for separating glycerol from spent lye in the soap industry is

A. fractional distillation

B. steam distillation

C. distillation under reduced pressure

D. simple distillation

Answer: C

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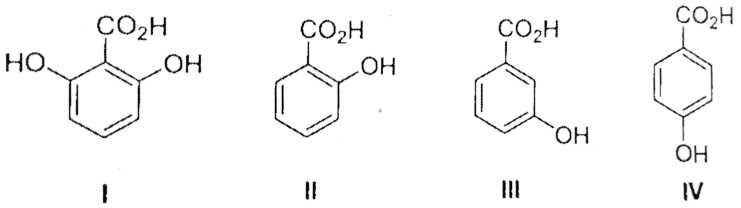
51. The correct order of acidity for the following compounds is



A. $I > II > III > IV$

B. $III > I > II > IV$

C. $III > IV > II > I$

D. $I > III > IV > II$

Answer: A

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52. For the estimation of nitrogen, 1.4 g of an organic compound was digested by Kjeldahl's method and the evolved ammonia was absorbed in 60 mL of $M/10$ sulphuric acid. The unreacted acid required 20 mL of $M/10$ sodium hydroxide for complete neutralisation. The percentage of nitrogen in the compound is

A. $6\ \%$

B. $10\ \%$

C. $3\ \%$

D. $5\ \%$

Answer: B

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53. A gaseous hydrocarbon gives upon combustion, 0.72 g of water and 3.08 g of CO_2. The empirical formula of the hydrocarbon is

A. C_2H_4

B. C_3H_4

C. C_6H_5

D. C_7H_8

Answer: D

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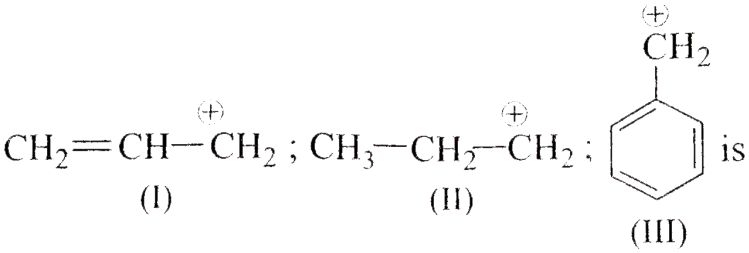
54. The order of stability of the following carbocation



A. $III > II > I$

B. $II > III > I$

C. $I > II > III$

D. $III > I > II$

Answer: D

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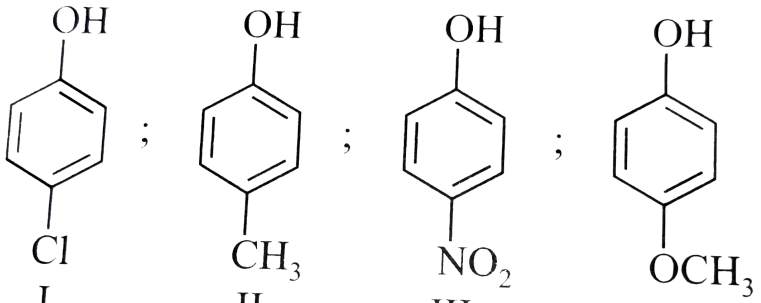
55. Arrange the following compounds in the order of decreasing acidity.



I II III IV

A. $II > IV > I > III$

B. $I > II > III > IV$

C. $III > I > II > IV$

D. $IV > III > I > II$

Answer: C

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56. A solution of (-l)- chloro -1 phenyletane in toluene recemises slowly in the presence of a small amunt of $SbCI_5$ due to the formation of .

A. carbanion

B. carbene

C. carbocation

D. free radical

Answer: C

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57. In allene (C_3H_4), the type(s) of hybridisation of the carbon atoms, is (are)

A. sp and sp^3

B. sp and sp^2

C. only sp^3

D. sp^2 and sp^3

Answer: B

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58. Among the following compounds, the most acid is:

A. p-nitrophenol

B. p-hydroxybenzoic acid

C. o-hydroxybenzoic acid

D. p-toluic acid

Answer: C

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59. Give the stability of the following resonance structures

(a) $H_2C = \overset{\oplus}{N} = \overset{\Theta}{N}$

(b) $H_2\overset{\oplus}{C} - N = \overset{\Theta}{N}$

(c) $H_2\overset{\Theta}{C}-\overset{\oplus}{N}\equiv N$

(d) $H_2\overset{\Theta}{C}-N=\overset{\oplus}{N}$.

A. $(I)>(II)>(IV)>(III)$

B. $(I)>(III)>(II)>(IV)$

C. $(II)>(I)>(III)>(IV)$

D. $(III)>(I)>(IV)>(II)$

Answer: B

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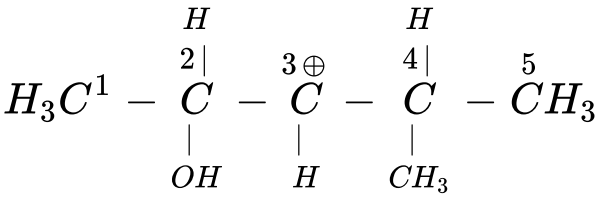
60. In the following carbocation, H/CH_3 that is most likely to migrate to the positively charged carbon is :



A. CH_3 at $C-4$

B. H at $C-4$

C. CH_3 at $C-2$

D. H at $C-2$

Answer: D

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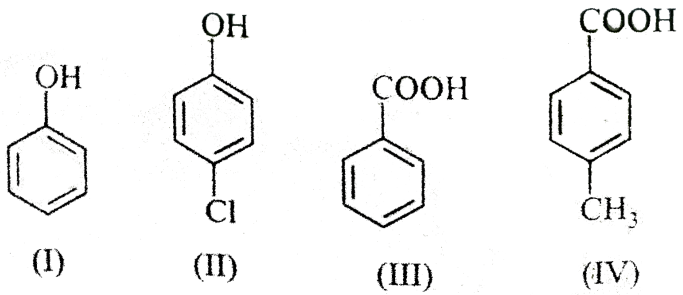
61. The correct acidity order of the following is



A. $(III) > (IV) > (II) > (I)$

B. $(IV) > (III) > (I) > (II)$

C. $(III) > (II) > (I) > (IV)$

D. $(II) > (III) > (IV) > (I)$

Answer: A

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62. Hyperconjugation involves the overlapping of the following orbitals :

A. $\sigma - \sigma$

B. $\sigma - p$

C. $p - p$

D. $\pi - \pi$

Answer: B

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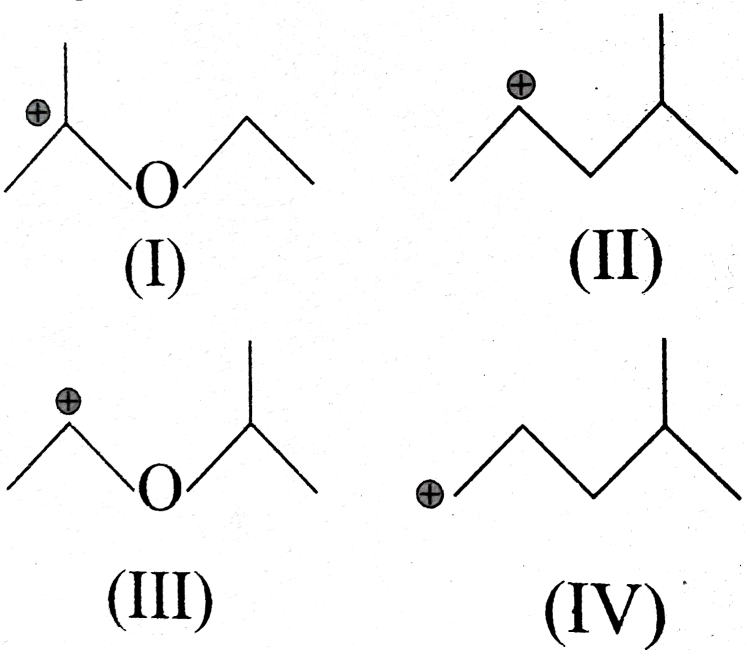
63. The correct of stability for the following species is

:



A. $(II) > (IV) > (I) > (III)$

B. $(I) > (II) > (III) > (IV)$

C. $(II) > (I) > (IV) > (III)$

D. $(I) > (III) > (II) > (IV)$

Answer: D

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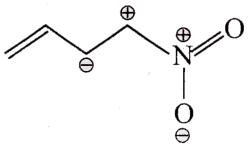
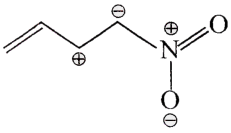
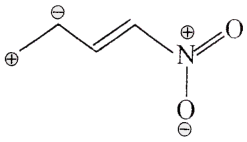
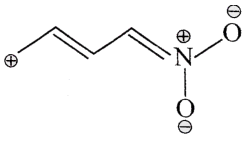
64. Among the following, the least stable resonance structure is :

A. 

B. 

C. 

D. 

Answer: A

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65. When benzene sulphonic acid and P-nitrophenol are treated with $NaHCO_3$, the gases released, respectively, are :

A. SO_2, NO_2

B. SO_2, NO

C. SO_2, CO_2

D. CO_2, CO_2

Answer: D

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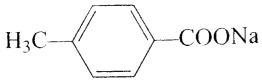
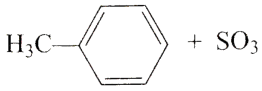
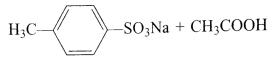
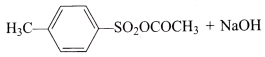
66. 4-Methyl benzene sulphonic acid with sodium acetate to give

A. 

B. 

C. 

D. 

Answer: C

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

A. $CH_2 - \overset{\oplus}{C}H - CH = CH - O - CH_3$

B. $CH_2 - CH = CH - CH = \overset{\oplus}{O} - CH_3$

C. $CH_2 = CH - \overset{\oplus}{C}H = CH - O - CH_3$

D. $CH_2 = CH - CH - CH = \overset{\oplus}{O} - CH_3$

Answer: C

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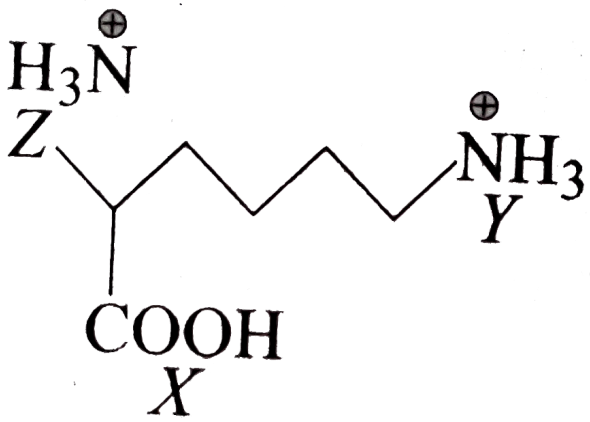
68. Arrange in the order of increasing acidic strengths.



A. $X > Z > Y$

B. $Z < X > Y$

C. $X > Y > Z$

D. $Z > X > Y$

Answer: A

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69. Among the following, the molecule with the highest dipole moment is :

A. CH_3Cl

B. CH_2Cl_2

C. CH_2Cl_2

D. CCl_4

Answer: A

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70. Which of the following represent the given mode of hybridisation $sp^2 - sp^2 - sp - sp$ from left to right?

A. $H_2C = CH - C \equiv N$

B. $HC \equiv C - C \equiv CH$

C. $H_2C = C = C = CH_2$

D. 

Answer: A

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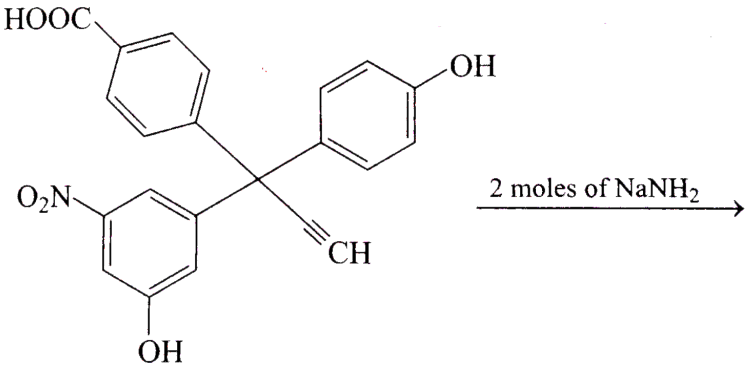
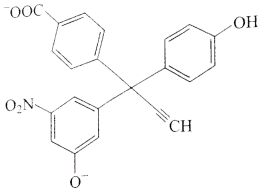
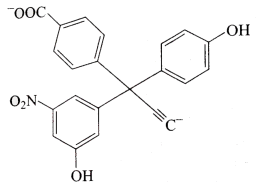
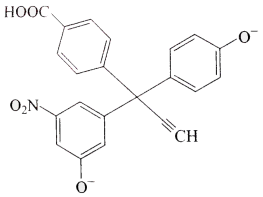


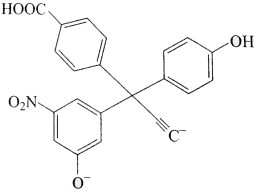
71.

The product A will be

A. 

B. 

C. 

D. 

Answer: A

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72. Which of the following acids has the smallest dissociation constant?

A. $CH_3CHFCOOH$

B. FCH_2CH_2COOH

C. $BrCH_2CH_2COOH$

D. $CH_3CHBrCOOH$

Answer: C

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73. Identify the correct order of boiling points of the following compounds: $CH_3\underset{1}{C}H_2CH_2CH_2OH$,

$CH_3\underset{2}{C}H_2CH_2CHO$

$CH_3\underset{3}{C}H_2CH_2COOH$

A. $1 > 2 > 3$

B. $3 > 1 > 2$

C. $1 > 3 > 2$

D. $3 > 2 > 1$

Answer: B

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74. Which of the following hydrocarbons has the lowest dipole moment?

A. cis-2-butene

B. 2-butyne

C. 1-butyne

D. $H_2C = CH - C \equiv CH$

Answer: B

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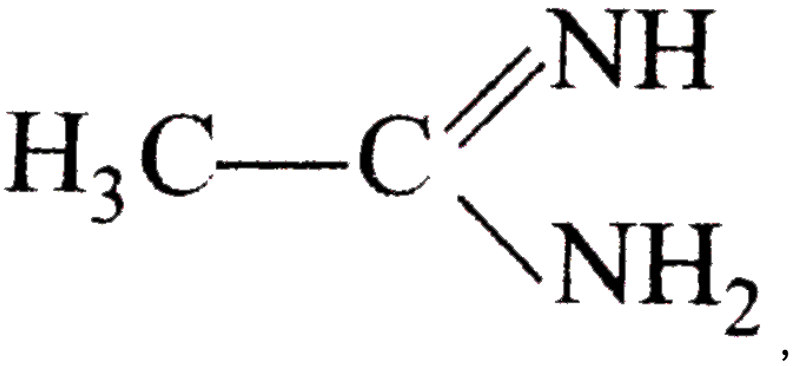
75. The correct order of basicities of the following compounds is



,

$CH_3CH_2NH_2$
(2)

$(CH_3)_2NH$
(3)

CH_3CONH_2
(4)

A. $2 > 1 > 3 > 4$

B. $1 > 3 > 2 > 4$

C. $3 > 1 > 2 > 4$

D. $1 > 2 > 3 > 4$

Answer: B

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76. Among the following the strongest base is

A. $C_6H_5NH_2$

B. $p - NO_2C_6H_4NH_2$

C. $m - NO_2 - C_6H_4NH_2$

D. $C_6H_5CH_2NH_2$

Answer: D

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77. Which of the following has the most acidic hydrogen ?

A. 3-hexanone

B. 2, 4-hexanedione

C. 2, 5-hexanedione

D. 2, 3-hexanedione

Answer: B

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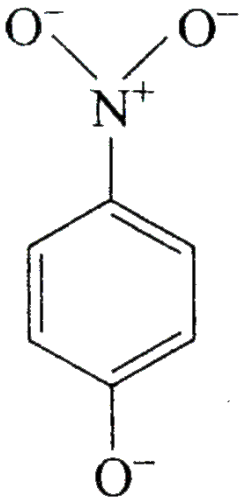
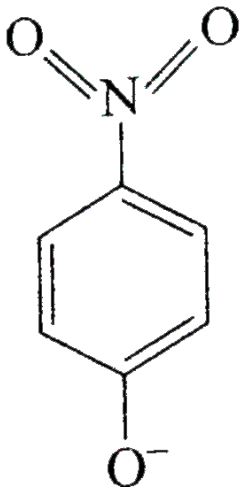
78. The most unlikely representation of resonance structures of p-nitrophenoxide ion is:

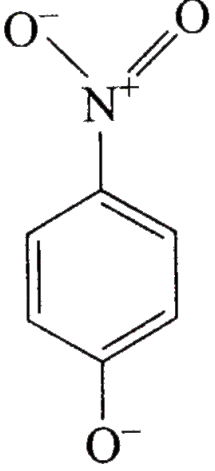
A.



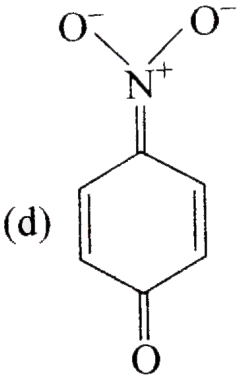
B.



C.



D.



Answer: B

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79. Among the following compounds, the strongest acid is:

A. $HC \equiv CH$

B. C_6H_6

C. C_2H_6

D. CH_3OH

Answer: D

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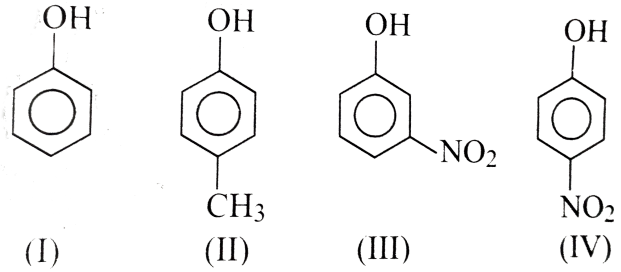
80. In the following compounds,



(I) (II) (III) (IV)

the order of acidity is:

A. $III > IV > I > II$

B. $I > IV > III > II$

C. $II > I > III > IV$

D. $IV > III > I > II$

Answer: D

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81. The decreasing order of strength of the bases, $OH^-, NH_2^-, H-C\equiv C^-$ and $CH_3-CH_2^-$:

A.

$$CH_3-CH_2^- > NH_2^- > H-C\equiv C^- > OH^-$$

B.

$$H-C\equiv C^- > CH_3-CH_2^- > NH_2^- > OH^-$$

C.

$$OH^- > NH_2^- > H-C\equiv C^- > CH_3-CH_2^-$$

D.

$$NH_2^- > H-C\equiv C^- > OH^- > CH_3-CH_2^-$$

Answer: A

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82. The hybridisation of C atoms in $(C-C)$ single-bond of $H-C\equiv C-CH=CH_2$ is :

A. sp^3-sp^3

B. sp^2-sp^3

C. $sp-sp^2$

D. sp^3-sp

Answer: C

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83. Amongst the following the most basic compound is :

A. benzylamine

B. aniline

C. acetanilide

D. p-nitroaniline

Answer: A

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84. The number of σ-and π-bond in 1-buten-3-yne is:

A. 5 sigma and 5 pi

B. 7 sigma and 3 pi

C. 8 sigma and 2 pi

D. 6 sigma and 4 pi

Answer: B

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85. The compound which would give the most stable carbcation on dehydration is :

A. $CH_3 - \underset{\displaystyle CH_3}{\overset{|}{CH}} - CH_2OH$

B. $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}} - OH$

C. $CH_3 - CH_2 - CH_2 - CH_2OH$

D. $CH_3 - \overset{\displaystyle OH}{\overset{|}{CH}} - CH_2 - CH_3$

Answer: B

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86. Polarisation of electrons in acrolein may be written as :

A. $\overset{\delta-}{H_2C} = CH - \overset{\overset{O}{||}}{\underset{\delta+}{C}} - H$

B. $\overset{\delta-}{H_2C} = CH - \overset{\delta+}{\overset{\overset{O}{||}}{C}} - H$

C. $\overset{\delta-}{H_2C} = \overset{\delta+}{C}H - \overset{\overset{O}{||}}{C} - H$

D. $\overset{\delta+}{H_2C} = CH - \overset{\delta-}{\overset{O}{\overset{||}{C}}} - H$

Answer: D

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87. The bond between carbon atom (1) and carbon atom (2) in the compound $N \equiv C - CH = CH_2$ in

involves the hybridisation as :

A. sp^2 ans sp^2

B. sp^3 and sp

C. sp and sp^2

D. sp and sp

Answer: C

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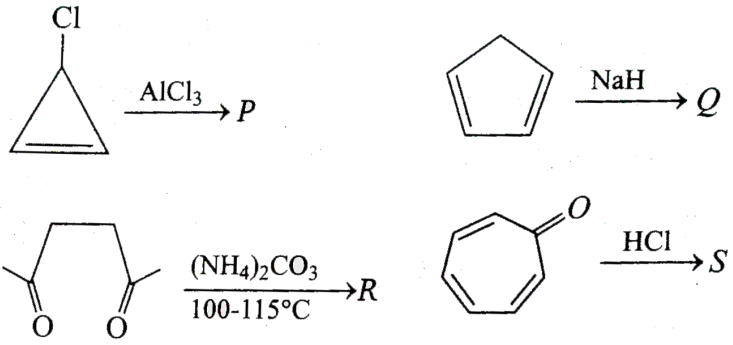
88. Among P, Q, R and S, the aromatic compounds(s) is/are



A. P

B. Q

C. R

D. S

Answer: A::B::C::D

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89. The hyperconjugative stabilities of tert-butyl cation and 2-butene, respectively, are due to

A. $\sigma \rightarrow p$ (empty) and $\sigma \rightarrow \pi^*$ electron delocalisations

B. $\sigma \rightarrow \sigma^*$ and $\sigma \rightarrow \pi$ electron delocalisations

C. $\sigma \rightarrow p$ (filled) and $\sigma \rightarrow \pi$ electron delocalisations

D. p(filled) $\rightarrow \sigma^*$ and $\sigma \rightarrow \pi^*$ electrons delocalisations

Answer: A

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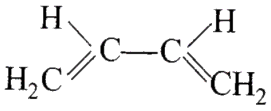
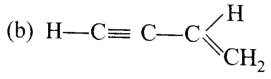
90. Amongst the given option, the compound(s) in which all the atoms are in one plane in all the possible conformations (if any), is/are

A. 

B. 

C. $H_2C = C = O$

D. $H_2C = C = CH_2$

Answer: B::C

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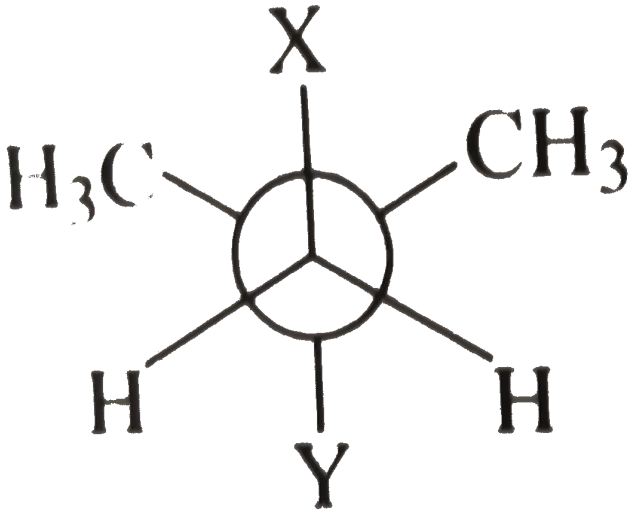
91. In the Newman projection for 2, 2- dimethylbutane



X and Y can, respectively, be

A. H and H

B. H and C_2H_5

C. C_2H_5 and H

D. CH_3 and CH_3

Answer: B::D

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92. The molecule (s) that will have dipole moment is/are:

A. 2, 2-dimethyl propane

B. trans-2-pentene

C. cis-3-hexene

D. 2, 2, 3, 3-tetramethyl butane

Answer: B::C

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93. The compounds in which C uses its sp^3- hybrid orbitals for bond formation are:

A. $HCOOH$

B. $(H_2N)_2CO$

C. $(CH_3)_3COH$

D. CH_3CHO

Answer: C::D

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94. Phenol is less acidic than

A. acetic acid

B. p-methoxy phenol

C. p-nitrophenol

D. ethanol

Answer: A::C

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95. p-Hydroxybenzoic acid has a lower boiling point than o-hydroxybenzoic acid.

o-Hydorxybenzoic acid has intramolecular hydrogen bonding.

A. Statement I is correct, Statement II is correct, Statement II is the correct explanation of statement I.

B. Statement I is correct, Statement II is correct, Statement II is not the correct explanation of statement I.

C. Statement I is correct, Statement II is incorrect

D. Statement I is incorrect, Statement II is correct

Answer: D

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96. Statement I: p-Nitrophenol is a stronger acid than o-nitrophenol.

Statement II: Intramolecular hydrogen bonding makes the o-isomer weaker than p-isomer.

A. Statement I is correct, Statement II is correct, Statement II is the correct explanation of statement I.

B. Statement I is correct, Statement II is correct, Statement II is not the correct explanation of statement I.

C. Statement I is correct, Statement II is incorrect

D. Statement I is incorrect, Statement II is correct

Answer: A

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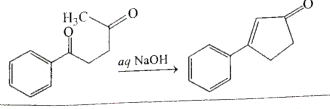
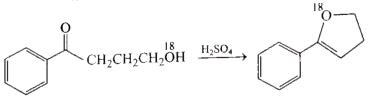
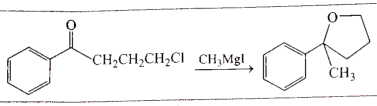
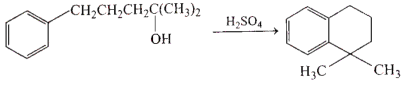
97. Match the reactions in Column I with appropriate types of steps/reactive intermediate involved in these

reactions as given in Column II.

Column I		Column II	
A.		p.	Nucleophilic substitution
B.		q.	Electrophilic substitution
C.		r.	Dehydration
D.		s.	Nucleophilic addition
		t.	Carbanion

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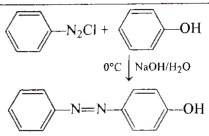
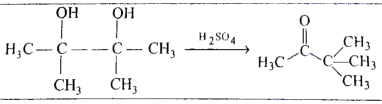
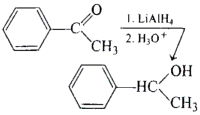
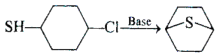
98. Match the reaction in Column I with appropriate options in Column II.

Column I	Column II
A. 	p. Racemic mixture
B. 	q. Addition reaction
C. 	r. Substitution reaction
D. 	s. Coupling reaction t. Carbocation intermediate

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99. The kind of delocalisation involving sigma bond orbitals is called.....

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100. The bond dissociation energy needed to form the benzyl radical from toluence is..... Than the formation of the methyl radical from methane.

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101. The structrue of the enol form of $CH_3 - CO - CH_2 - CO - CH_3$ with intermolecular hydrogen bonding is.....

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102. The $IUPAC$ name of succinic acid is.....

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103. The shape of $(CH_3)^+$ is .....

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104. A..... Diol has two hydroxyl groups on ..... Carbon atoms.

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105. The terminal C atom in butane is .....hybridised.

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106. .....ring is the most strained. (Cyclopropane, Cyclobutane, Cyclopentane)

Watch Video Solution

107. The compounds having both $sp-$ and sp^2-hybrideised C atmos is ..... (propene, propane, propdiene.

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108. In acidic medium, ... Behaves as the strongest base. (nitrobenzene, aniline, phenol)

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109. Among the given cations,.....is most stable (sec-bytyl carbonium ion, tert-butyl carbonium ion, n-butyl carbonium ion).

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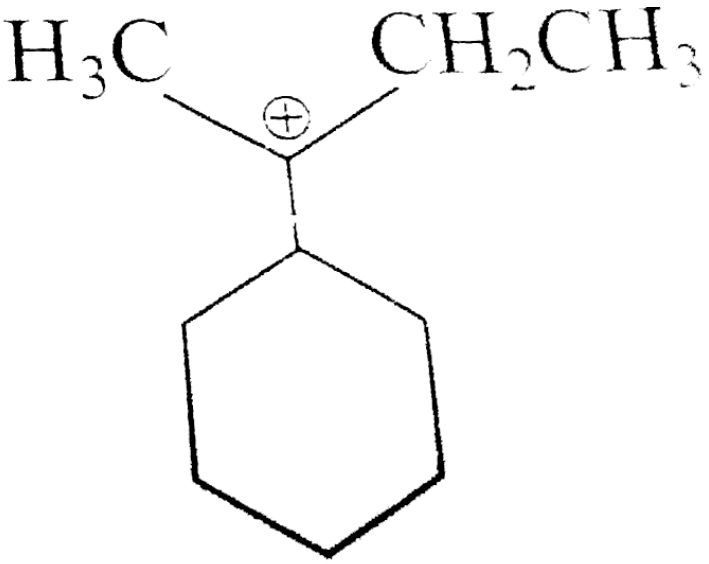
110. The total number of contributing structures showing hyperconjugation (involving $C-H$ bonds)

for the following carbocation is:



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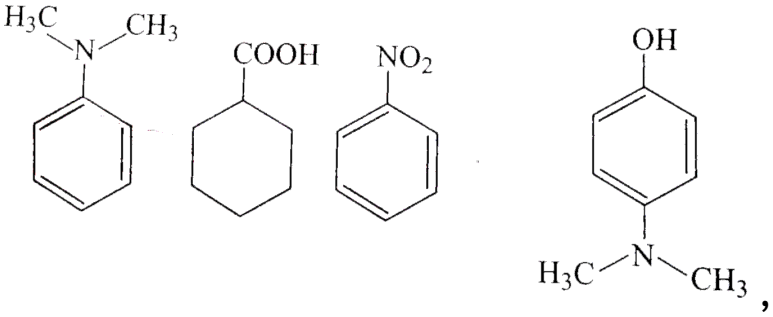
111. Amongst the following, the number of compounds soluble in aqueous $NaOH$ is

`?



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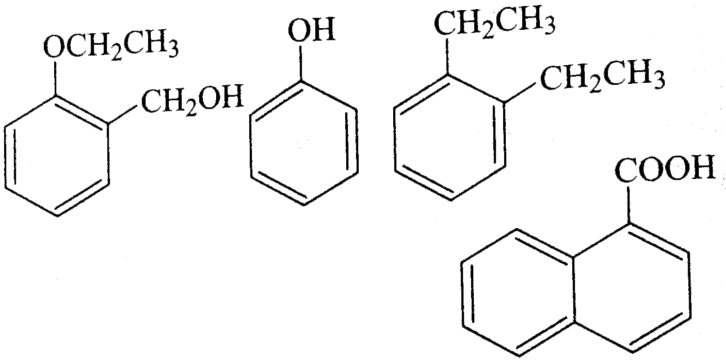

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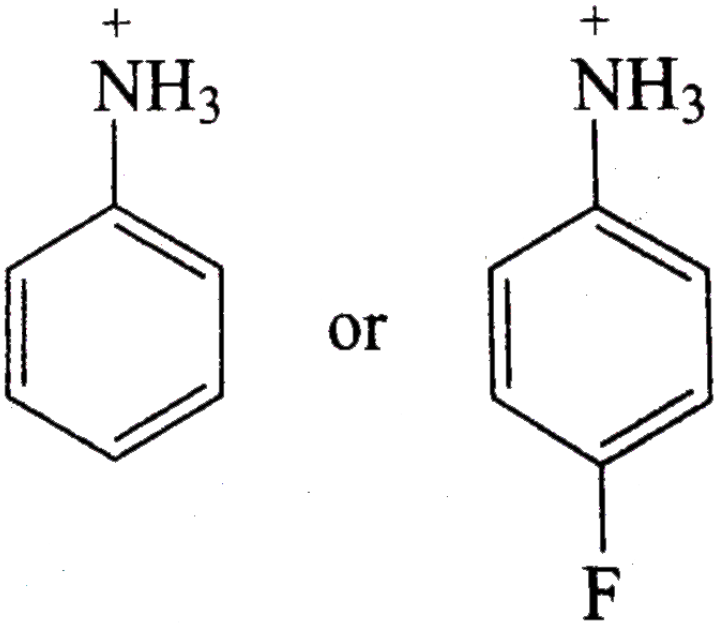
112. Which of the following is more acidic and why?



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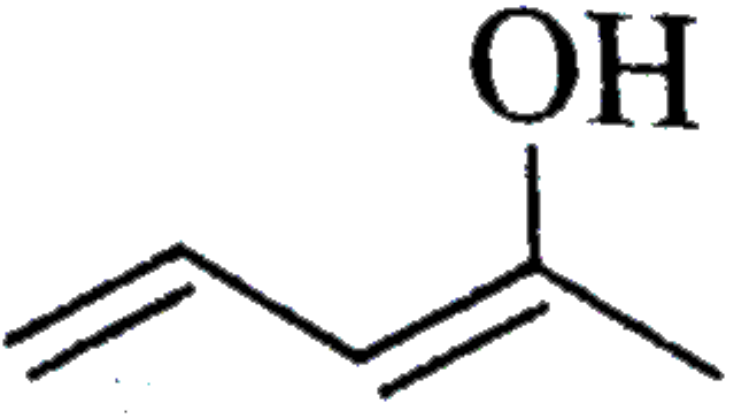
113. Draw the resonating structures of



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114. You have an ether solution containing 4-hydroxybenzoic acid and 4-aminobenzoic acid. Explain, how will you separate the two in not more than 3

steps? Give confirmatory tests with reagents and conditions for functional groups of each.

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115. Match the following with their K_a values

Benzoic acid	4.2×10^{-5}
p-nitrobenzoic acid	6.4×10^{-5}
p-chlorobenzoic acid	6.4×10^{-5}
p-methylbenzoic acid	36.2×10^{-5}
p-methorybenzoic acid	10.2×10^{-5}

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116. Give reasons for the following:

$CH_2 = CH^{\Theta}$ is more basic than $HC \equiv C^{\Theta}$

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117. Explain, why o-hydroxybenzaldehyde is a liquid at room temperature while p-hydroxybenzaldehyde is a figh melting solid?

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118. Discuss the hybridisation of carbon atoms in allene (C_3H_4) and show the π-orbital overlap.

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119. Give reasons for the following in one or two sentences.

the central carbon-carbon bond 1, 3-butadiene is shorter than that of n-butane.

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120. Although phenoxide ion has more number of resonating structures than benzote ion, benzoic acid is a stronger acid than phe4nol. Why ?

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121. Arrange the following in the increasing order of their basicities.

(I) $p-$ Toluidine

(II) $N, N-$ Dimethyl-p-toluidine

(III) $p-$ Nitroaniline`

(IV) Aniline.

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122. Rotation of groups about bond are usually restricted due to large torsional strain and it is due to this reason cis and trans isomers have their independent existence. However certain structural

modification in the compound makes the rotation of groups about double possible and hence for such compound, cis and trans isomer exist together in equilibrium. Which of the following compound has such structural feature and its cis and trans isomers exist together in equilibrium?

A. $CH_3 - CH = CH - CHO$

B. $CH_3 - CH = CH - CH_3$

C. $Cyclohexyl$-CH=CH-$Cyclohexyl$

D. $CH_3 - CH = NH$

Answer: a

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123. If 2-methylbutane is chlorinated to produce chloro-2 - methylbutane, how many isomers (including stereoisomers) would be formed?

A. 3

B. 4

C. 5

D. 6

Answer: d

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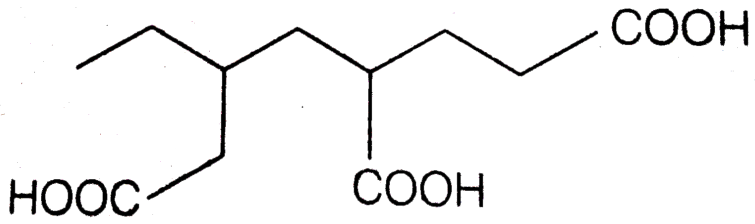
124. IUPAC name of the following compound is



A. $6-ethyl-1,4,8-octtanetrioicacid$

B. $3-ethyl-1,5,8-octtanetrioicacid$

C. $3-ethyl-50carb\otimes yoctanedioicacid$

D. $4-carb\otimes y-6-ethyloctanedioicacid$

Answer: b

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125. The type of isomerism explected in the molecule with molecular formula C_3H_6O

A. functional

B. positional

C. keto-anol tautomerism

D. geometrical

Answer: c

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126. Which of the following is not a redox reaction?

A. $CH_2 = CH_2 + H_2 / pt \rightarrow C_2H_6$

B. $CH_2 = CH_2 + Br_2 \rightarrow C_2H_4Br_2$

C. $CH_2 = CH_2 + HBr \rightarrow C_2H_5Br$

D. $CH_3CH_2OH + Br_2 \rightarrow CH_2CHO + 2HBr$

Answer: c

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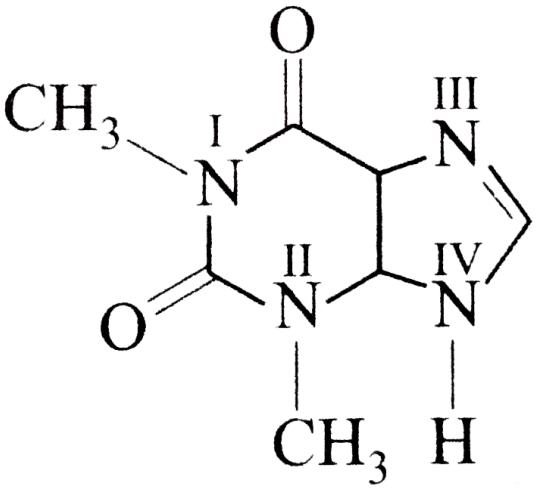
127. The correct increasing order of basic strength of the labeled N is:



A. $1 < 2 < 3 < 4$

B. $4 < 3 < 2 < 1$

C. $1 < 3 < 4 < 2$

D. $1 < 2 < 4 < 3$

Answer: d

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128. Dichlorocyclopentane can exhibit

A. positional isomerism

B. geometrical isomerism

C. functional isomerism

D. optical isomerism

Answer: a, b, c, d

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129. Which of the following is/are true for a free radical?

A. It is always formed by homoletic cleavage of bond

B. It is always electron deficient, act as a Lewis acid

C. It is always paramagnetic

D. It always disproportionate to some extent

Answer: a, c

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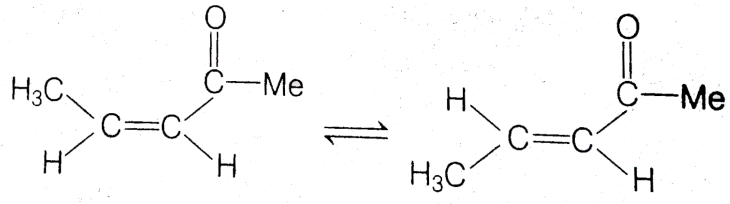
130. Consider the following processes



The correct prediction regarding the above isomerisation is/are

A. $K_{eq} > 1$

B. Isomerisation is due to existence of resonance properties in the molecule

C. $C = C$ double bond length is longer than the same in a normal alkene

D. Electron moves towards carbonyl group during resonance

Answer: a, b, c, d

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131. A solution contain three stereo-isomers of 2, 3-dihydroxy butanedioic acid. On fractional crystallisation of this solution, two fractions: Fraction-1 and Fraction-II are separated. Fraction-I on reaction with (+)-2-butanamine gives a single salt while fraction-II on reaction with the same (+)-2-butanamine gives a mixture of two salts. answer the following three question based on the above information

(a) Molecules of fraction-I are enantiomers

(b) Molecules of fraction-I are meso compound

(c) Molecules of fraction-I are in racemic form

(d) Molecules of fraction-I has no chiral centre

What is the relationship between the molecules of fraction-I with the molecules of fraction-II?

A. They are enantiomers

B. They are identical

C. They are diastereomers

D. They are diastereomers as well as optically active

Answer: c

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132. A solution contain three stereo-isomers of 2, 3-dihydroxy butanedioic acid. On fractional crystallisation of this solution, two fractions: Fraction-

1 and Fraction-II are separated. Fraction-I on reaction with (+)-2-butanamine gives a single salt while fraction-II on reaction with the same (+)-2-butanamine gives a mixture of two salts. answer the following three question based on the above information

(a) Molecules of fraction-I are enantiomers

(b) Molecules of fraction-I are meso compound

(c) Molecules of fraction-I are in racemic form

(d) Molecules of fraction-I has no chiral centre

What is the relationship between the two different salts obtained from fraction-II?

A. They are structural isomers

B. They are enantiomers

C. They are diastereomers

D. They are conformers

Answer: c

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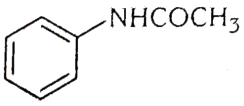
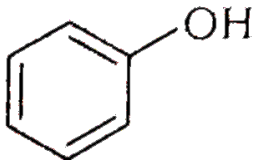
133. An analust is trying to separate a mixture containing the following four organic compounds

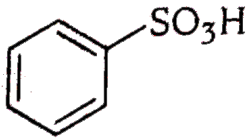
She dissolved the mixture in ether and treated the solution with aqueous $NaOH$ solution and finally separated the two fractions: Fraction-I (ether) and Fraction-II (aqueous). Later she acidified Fraction-1

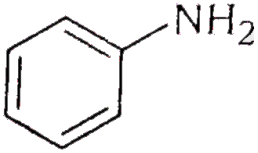
and was able to distill the organic compound(s) into ether to obtain third fraction, Fraction-III. Fraction-III was then treated with aqueous $NaHCO_3$ and the two layers, ether layer (Fraction-IV) and aqueous layer (Fraction-V) were separated. Also Fraction-I was treated with aqueous HCl solution and the two layers, other (Fraction-VI) and aquores layer (Fraction-VII) were seperated. Answer the following three questions based on the above information.

Fraction-V on acidification followed by distillation will give

A. 

B. 

C. 

D. 

Answer: c

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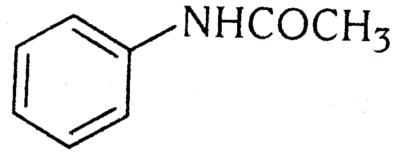
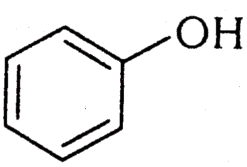
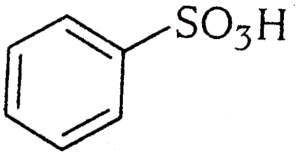
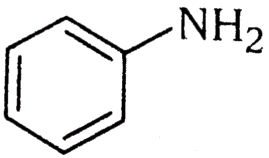
134. An analust is trying to separate a mixture containing the following four organic compounds





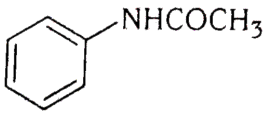


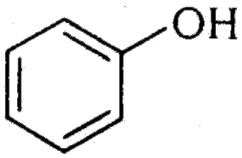


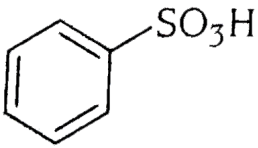
She dissolved the mixture in ether and treated the solution with aqueous $NaOH$ solution and finally separated the two fractions: Fraction-I (ether) and Fraction-II (aqueous). Later she acidified Fraction-1 and was able to distill the organic compound(s) into ether to obtain third fraction, Fraction-III. Fraction-III was then treated with aqueous $NaHCO_3$ and the two layers, ether layer (Fraction-IV) and aqueous layer (Fraction-V) were separated. Also Fraction-I was treated with aqueous HCl solution and the two layers, other (Fraction-VI) and aquores layer (Fraction-

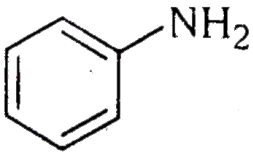
VII) were seperated. Answer the following three questions based on the above information.

The species left in fraction VI is

A. 

B. 

C. 

D. 

Answer: a

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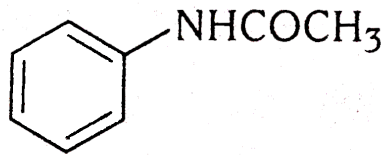
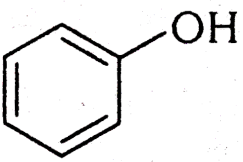
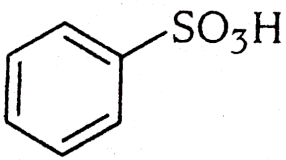
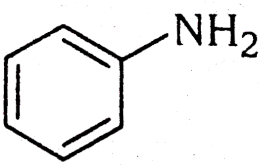
135. An analust is trying to separate a mixture containing the following four organic compounds









She dissolved the mixture in ether and treated the solution with aqueous $NaOH$ solution and finally separated the two fractions: Fraction-I (ether) and Fraction-II (aqueous). Later she acidified Fraction-1 and was able to distill the organic compound(s) into ether to obtain third fraction, Fraction-III. Fraction-III was then treated with aqueous $NaHCO_3$ and the

two layers, ether layer (Fraction-IV) and aqueous layer (Fraction-V) were separated. Also Fraction-I was treated with aqueous HCl solution and the two layers, other (Fraction-VI) and aquores layer (Fraction-VII) were seperated. Answer the following three questions based on the above information.

What is true about the species left in fraction-IV?

A. It is stronger acid than carbonic acid

B. It is stronger acid than water

C. It is neutral to moistened litmus paper

D. It cannot be extracted into an aqueous $Ba(OH)_2$ solution

Answer: b

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136. Assertion Geometrical isomers are non-inter-convertible by rotation.

Reason Alkenes have restricted rotation about pi(π) bond.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct and reason is not the correct explanation of the assertion.

C. Assertion is correct but reason is incorrect

D. Assertion is incorrect but reason is correct

Answer: b

137. Assertion A molecule containing chiral carbon must be non-superimposable on its mirror image. ltbr.

Reason A chiral carbon is bonded to four different atoms or groups.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct and reason is not the correct explanation of the assertion.

C. Assertion is correct but reason is incorrect

D. Assertion is incorrect but reason is correct

Answer: d

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138. Assertion p-nitro toluene undergoes faster free radical chlorination at the methyl group than toluene. Reason Nitro group from para position promote hyperconjugation in toluene.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct and reason is not the correct explanation of the assertion.

C. Assertion is correct but reason is incorrect

D. Assertion is incorrect but reason is correct

Answer: d

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139. Assertion A phenyl carbanion $\left(C_6H_5^-\right)$ is more stable than a benzyl carbanion $\left(C_6H_5CH_2^-\right)$

Reason In benzyl phenyl carbanion the negatively charged carbon has hreater s-character than the same in benzyl carbanion.

A. Both assertion and reason are correct and reason is the correct explanation of the assertion.

B. Both assertion and reason are correct and reason is not the correct explanation of the assertion.

C. Assertion is correct but reason is incorrect

D. Assertion is incorrect but reason is correct

Answer: d

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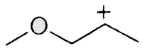
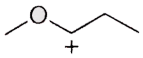
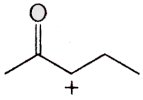
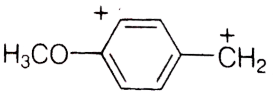
140. Match the quantity of column I with the quantity of column II:

	Column I		Column II
A.	Undergoes favourable hydride shift	p.	
B.	Has resonance stability	q.	
C.	More stable than two of them	r.	
D.	Most difficult to be formed	s.	

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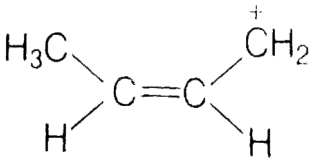
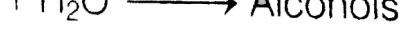
141. If the following carbocation undergo hydration, how may different alcohols would be formed?





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Interger Answer Type Questions

1. (a) Draw Newman's projection for the stable staggered form of butane.

(b) Relatively less stability of the staggered form is due to

(i) Torsional strain

(ii) van der Waals' strain

(iii) Combination of the above two

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Chapter Test

1. Which of the following pair of acid and base will produce maximum amount of heat when their same number of gram equivalents is allowed to react?

A. $HCOOH + HN_3$

B. $FCH_2COOH + CH_3NH_2$

C. $CH_3COOH + NH_3$

D. $ClNH_2 + HCl$

Answer: d

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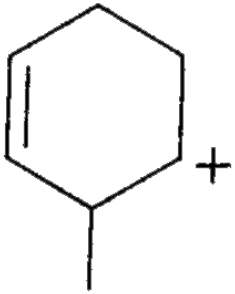
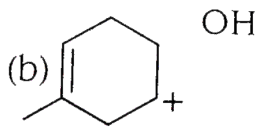
2. Which of the following have all the resonance structures more stable than the shown one?

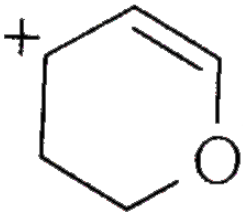
A.



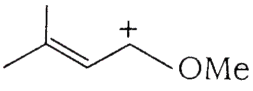
B.



C.



D.



Answer: b, d

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