Chapter 13 Hydrocarbons

1. Which one is the correct order of acidity?

(a) $CH{\equiv}CH > CH_3{-}C{\equiv}CH > CH_2{=}CH_2 > CH_3{-}CH_3$

(b) $CH{\equiv}CH > CH_2{=}CH_2 > CH_3{-}C{\equiv}CH > CH_3{-}CH_3$

(c) $CH_3{-}CH_3 > CH_2{=}CH_2 > CH_3{-}C{\equiv}CH > CH{\equiv}CH$

(d) $CH_2{=}CH_2 > CH_3{-}CH{=}CH_2 > CH_3{-}C{\equiv}CH > CH{\equiv}CH$

(NEET 2017)

2. Predict the correct intermediate and product in the following reaction :

$$H_3C{-}C{\equiv}CH \xrightarrow[HgSO_4]{H_2O,\ H_2SO_4} \underset{(A)}{\text{Intermediate}} \rightarrow \underset{(B)}{\text{Product}}$$

(a) $A: H_3C{-}\underset{\underset{OH}{|}}{C}{=}CH_2$ $B: H_3C{-}\underset{\underset{SO_4}{|}}{C}{=}CH_2$

(b) $A: H_3C{-}\underset{\underset{O}{\|}}{C}{-}CH_3$ $B: H_3C{-}C{\equiv}CH$

(c) $A: H_3C{-}\underset{\underset{OH}{|}}{C}{=}CH_2$ $B: H_3C{-}\underset{\underset{O}{\|}}{C}{-}CH_3$

(d) $A: H_3C{-}\underset{\underset{SO_4}{|}}{C}{=}CH_2$ $B: H_3C{-}\underset{\underset{O}{\|}}{C}{-}CH_3$

(NEET 2017)

3. With respect to the conformers of ethane, which of the following statements is true?

(a) Bond angle changes but bond length remains same.

(b) Both bond angle and bond length change.

(c) Both bond angle and bond length remain same.

(d) Bond angle remains same but bond length changes. *(NEET 2017)*

4. Which of the following can be used as the halide component for Friedel–Crafts reaction?

(a) Chlorobenzene (b) Bromobenzene

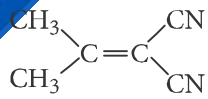
(c) Chloroethene

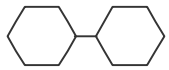
(d) Isopropyl chloride *(NEET-II 2016)*

5. In which of the following molecules, all atoms are coplanar?

(a) 

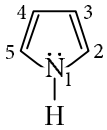
(b) 

(c) 

(d) 

(NEET-II 2016)

6. In pyrrole the electron density is maximum on

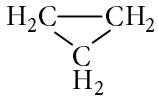


(a) 2 and 3 (b) 3 and 4

(c) 2 and 4 (d) 2 and 5

(NEET-II 2016)

7. Which of the following compounds shall not produce propene by reaction with HBr followed by elimination or direct only elimination reaction?

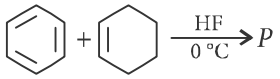
(a) 

(b) $H_3C{-}\overset{H_2}{C}{-}CH_2OH$

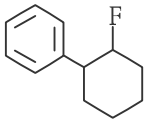
(c) $H_2C{=}C{=}O$

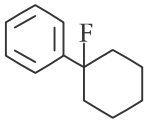
(d) $H_3C{-}\overset{H_2}{C}{-}CH_2Br$ *(NEET-II 2016)*

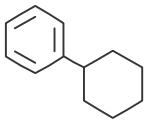
8. In the given reaction,

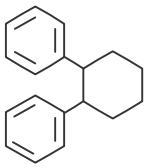


the product P is

(a) 

(b) 

(c) 

(d) 

(NEET-II 2016)

9. The compound that will react most readily with gaseous bromine has the formula

(a) C_3H_6 (b) C_2H_2
(c) C_4H_{10} (d) C_2H_4

(NEET-II 2016)

10. The correct statement regarding the comparison of staggered and eclipsed conformations of ethane, is

(a) the eclipsed conformation of ethane is more stable than staggered conformation even though the eclipsed conformation has torsional strain
(b) the staggered conformation of ethane is more stable than eclipsed conformation, because staggered conformation has no torsional strain
(c) the staggered conformation of ethane is less stable than eclipsed conformation, because staggered conformation has torsional strain
(d) the eclipsed conformation of ethane is more stable than staggered conformation, because eclipsed conformation has no torsional strain. *(NEET-I 2016)*

11. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3. If a large amount of $KHSO_4$ is added to the mixture, the rate of nitration will be

(a) unchanged (b) doubled
(c) faster (d) slower.

(NEET-I 2016)

12. The pair of electrons in the given carbanion, $CH_3C{\equiv}C^-$, is present in which of the following orbitals?

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

(NEET-I 2016)

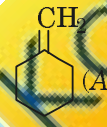
13. In the reaction

$$H{-}C{\equiv}CH \xrightarrow[\text{(ii) } CH_3CH_2Br]{\text{(i) } NaNH_2/\text{liq. } NH_3} X \xrightarrow[\text{(ii) } CH_3CH_2Br]{\text{(i) } NaNH_2/\text{liq. } NH_3} Y,$$

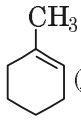
X and Y are

(a) X = 2-Butyne, Y = 2-Hexyne
(b) X = 1-Butyne, Y = 2-Hexyne
(c) X = 1-Butyne, Y = 3-Hexyne
(d) X = 2-Butyne, Y = 3-Hexyne. *(NEET-I 2016)*

14. In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule to give a product 1-chloro-1 methylcyclohexane. The possible alkene is

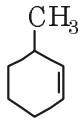
(a) 

(A)

(b) 

(B)

(c) (A) and (B)

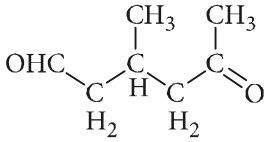
(d) 

(2015)

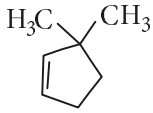
15. 2,3-Dimethyl-2-butene can be prepared by heating which of the following compounds with a strong acid?

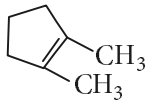
(a) $(CH_3)_3CCH{=}CH_2$
(b) $(CH_3)_2C{=}CHCH_2CH_3$
(c) $(CH_3)_2CHCH_2CH{=}CH_2$
(d) $(CH_3)_2CH{-}\underset{\underset{CH_3}{|}}{CH}{-}CH{=}CH_2$ *(2015)*

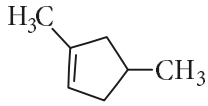
16. A single compound of the structure,

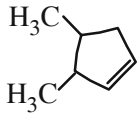


is obtainable from ozonolysis of which of the following cyclic compounds?

(a) 

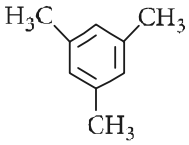
(b) 

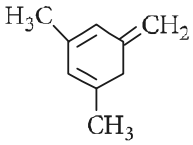
(c) 

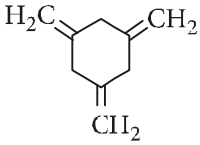
(d) 

(2015, Cancelled)

17. Given :

I. 

II. 

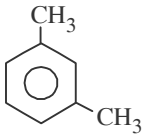
III. 

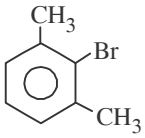
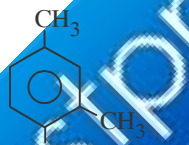
The enthalpy of hydrogenation of these compounds will be in the order as

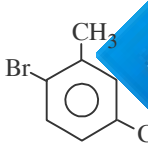
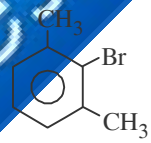
(a) II > III > I (b) II > I > III
(c) I > II > III (d) III > II > I

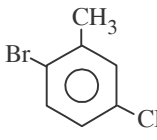
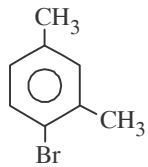
(2015, Cancelled)

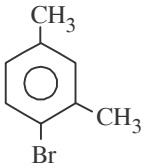
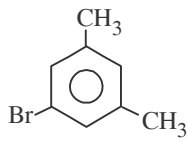
18. What products are formed when the following compound is treated with Br_2 in the presence of $FeBr_3$?



(a)  and 

(b)  and 

(c)  and 

(d)  and 

(2014)

19. Identify Z in the sequence of reactions :

$$CH_3CH_2CH{=}CH_2 \xrightarrow{HBr/H_2O_2} Y \xrightarrow{C_2H_5ONa} Z$$

(a) $CH_3{-}(CH_2)_3{-}O{-}CH_2CH_3$
(b) $(CH_3)_2CH{-}O{-}CH_2CH_3$
(c) $CH_3(CH_2)_4{-}O{-}CH_3$
(d) $CH_3CH_2{-}CH(CH_3){-}O{-}CH_2CH_3$ *(2014)*

20. Which of the following organic compounds has same hybridization as its combustion product (CO_2)?

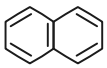
(a) Ethane (b) Ethyne
(c) Ethene (d) Ethanol *(2014)*

21. Which of the following compounds will not undergo Friedal-Craft's reaction easily?

(a) Nitrobenzene (b) Toluene
(c) Cumene (d) Xylene

(NEET 2013)

22. Which of the following chemical system is non aromatic?

(a)  (b) 

(c)  (d) 

(Karnataka NEET 2013)

23. In the following reaction:

$$HC{\equiv}CH \xrightarrow[Hg^{2+}]{H_2SO_4} \text{'}P\text{'}$$

Product 'P' will not give

(a) Tollen's reagent test
(b) Brady's reagent test
(c) Victor Meyer test
(d) Iodoform test *(Karnataka NEET 2013)*

24. In the following reaction

$$H_3C{-}\underset{CH_3}{\overset{CH_3}{C}}{-}CH{=}CH_2 \xrightarrow{H_2O/H^{\oplus}} \underset{\text{Major product}}{A} + \underset{\text{Minor product}}{B}$$

The major product is

(a) $H_3C{-}\underset{OH}{\overset{CH_3}{C}}{-}\underset{CH_3}{CH}{-}CH_3$

(b) $\underset{OH}{CH_2}{-}\underset{CH_3}{\overset{CH_3}{C}}{-}CH_2{-}CH_3$

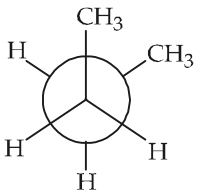
(c) $H_3C{-}\underset{CH_3}{\overset{CH_3}{C}}{-}\underset{OH}{CH}{-}CH_3$

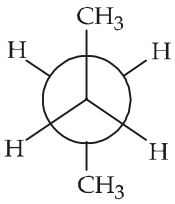
(d) $H_3C{-}\underset{CH_3}{\overset{CH_3}{C}}{-}CH_2{-}\underset{OH}{CH_2}$ *(2012)*

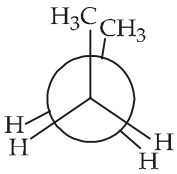
25. Which of the following acids does not exhibit optical isomerism?
(a) Maleic acid (b) α-amino acids
(c) Lactic acid (d) Tartaric acid
(2012)

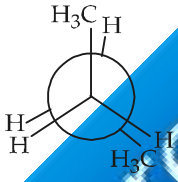
26. Which of the following reagents will be able to distinguish between 1-butyne and 2-butyne?
(a) $NaNH_2$ (b) HCl
(c) O_2 (d) Br_2
(Mains 2012)

27. In the following the most stable conformation of *n*-butane is

(a) 

(b) 

(c) 

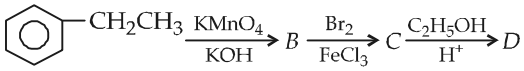
(d) 

(2010)

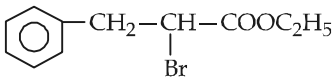
28. Liquid hydrocarbons can be converted to a mixture of gaseous hydrocarbons by
(a) oxidation (b) cracking
(c) distillation under reduced pressure
(d) hydrolysis. *(2010)*

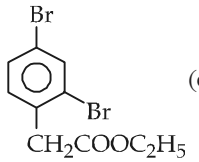
29. The reaction of toluene with Cl_2 in presence of $FeCl_3$ gives *X* and reaction in presence of light gives *Y*. Thus, *X* and *Y* are
(a) *X* = Benzal chloride, *Y* = *o*-chlorotoluene
(b) *X* = *m*-chlorotoluene, *Y* = *p*-chlorotoluene
(c) *X* = *o*- and *p*-chlorotoluene,
Y = Trichloromethyl benzene
(d) *X* = Benzyl chloride, *Y* = *m*-chlorotoluene
(2010)

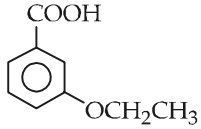
30. In a set of reactions, ethylbenzene yielded a product *D*.

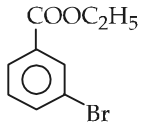


D would be

(a) 

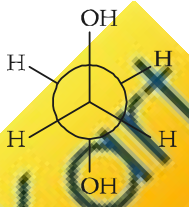
(b) 

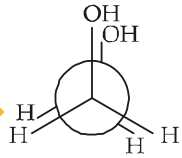
(c) 

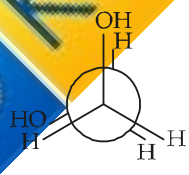
(d) 

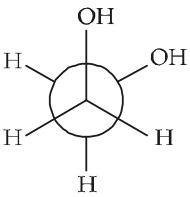
(2010)

31. Which of the following conformers for ethylene glycol is most stable?

(a) 

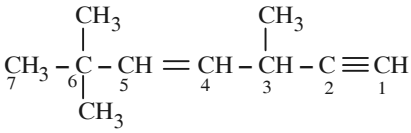
(b) 

(c) 

(d) 

(Mains 2010)

32. The state of hybridisation of C_2, C_3, C_5 and C_6 of the hydrocarbon,



is in the following sequence
(a) sp^3, sp^2, sp^2 and sp
(b) sp, sp^2, sp^2 and sp^3
(c) sp, sp^2, sp^3 and sp^2
(d) sp, sp^3, sp^2 and sp^3 *(2009)*

33. Which of the following compounds will exhibit *cis-trans (geometrical)* isomerism?
(a) Butanol (b) 2-Butyne
(c) 2-Butenol (d) 2-Butene
(2009)

34. Benzene reacts with CH_3Cl in the presence of anhydrous $AlCl_3$ to form
(a) chlorobenzene (b) benzyl chloride
(c) xylene (d) toluene.
(2009)

35. $H_3C-\underset{\underset{CH_3}{|}}{CH}-CH=CH_2 + HBr \longrightarrow A$

A (predominantly) is

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

(b) $CH_3-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{Br}{|}}{CH}-CH_3$

(c) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-CH_2Br$

(d) $CH_3-\overset{\overset{Br}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_2CH_3$ *(2008)*

36. In the hydrocarbon,

$\underset{6}{CH_3}-\underset{5}{CH}=\underset{4}{CH}-\underset{3}{CH_2}-\underset{2}{C}\equiv\underset{1}{CH}$

The state of hybridization of carbons 1, 3 and 5 are in the following sequence

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

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

(2008)

37. Predict the product C obtained in the following reaction of 1-butyne.

$CH_3CH_2-C\equiv CH + HCl \longrightarrow B \xrightarrow{HI} C$

(a) $CH_3-CH_2-CH_2-\overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}}-H$

(b) $CH_3-CH_2-\overset{\overset{I}{|}}{CH}-CH_2Cl$

(c) $CH_3CH_2-\overset{\overset{I}{|}}{\underset{\underset{Cl}{|}}{C}}-CH_3$

(d) $CH_3-\underset{\underset{Cl}{|}}{CH}-CH_2CH_2I$ *(2007)*

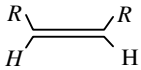
38. Which of the compound with molecular formula C_5H_{10} yields acetone on ozonolysis?

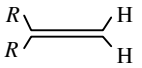
(a) 3-Methyl-1-butene (b) Cyclopentane

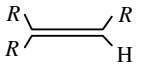
(c) 2-Methyl-1-butene (d) 2-Methyl-2-butene

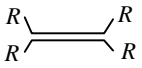
(2007)

39. Which one of the following alkenes will react faster with H_2 under catalytic hydrogenation conditions?

(a) 

(b) 

(c) 

(d) 

(R = alkyl substituent)

(2005)

40. Products of the following reaction :

$CH_3C\equiv CCH_2CH_3 \xrightarrow[\text{(ii) hydrolysis}]{\text{(i) } O_3}$ are

(a) $CH_3COOH + CO_2$

(b) $CH_3COOH + HOOC.CH_2CH_3$

(c) $CH_3CHO + CH_3CH_2CHO$

(d) $CH_3COOH + CH_3COCH_3$ *(2005)*

41. Using anhydrous $AlCl_3$ as catalyst, which one of the following reactions produces ethylbenzene (PhEt)?

(a) $H_3C-CH_2OH + C_6H_6$

(b) $CH_3-CH=CH_2 + C_6H_6$

(c) $H_2C=CH_2 + C_6H_6$

(d) $H_3C-CH_3 + C_6H_6$ *(2004)*

42. Reaction of HBr with propene in the presence of peroxide gives

(a) isopropyl bromide

(b) 3-bromopropane

(c) allyl bromide

(d) n-propyl bromide. *(2004)*

43. The compound $CH_3-\overset{\overset{CH_3}{|}}{C}=CH-CH_3$ on reaction with $NaIO_4$ in the presence of $KMnO_4$ gives

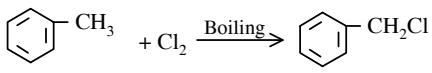
(a) CH_3COCH_3

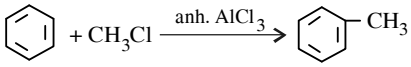
(b) $CH_3COCH_3 + CH_3COOH$

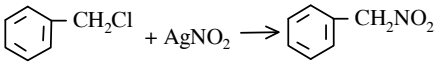
(c) $CH_3COCH_3 + CH_3CHO$

(d) $CH_3CHO + CO_2$ *(2003)*

44. Which one of the following is a free-radical substitution reaction?

(a) 

(b) 

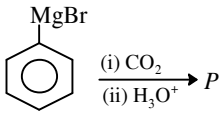
(c) 

(d) $CH_3CHO + HCN \rightarrow CH_3CH(OH)CN$

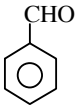
(2003)

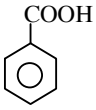
45. The correct order of reactivity towards the electrophilic substitution of the compounds aniline (I), benzene (II) and nitrobenzene (III) is

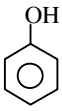
(a) III > II > I (b) II > III > I
(c) I < II > III (d) I > II > III
(2003)

46. 

In the above reaction product *P* is

(a) 

(b) 

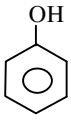
(c) 

(d) $C_6H_5-\overset{\overset{O}{||}}{C}-C_6H_5$
(2002)

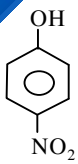
47. When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is
(a) $CH_3-CH=CH_2$ (b) $CH_3-C\equiv CH$
(c) $CH_3CH_2CH(NH_2)_2$ (d) $CH_3CH_2CH(Cl)NH_2$
(2002)

48. In preparation of alkene from alcohol using Al_2O_3 which is the effective factor?
(a) Porosity of Al_2O_3
(b) Temperature
(c) Concentration
(d) Surface area of Al_2O_3. *(2001)*

49. The correct acidic order of the following is

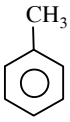
I. 

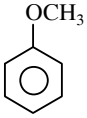
II. 

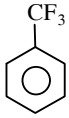
III. 

(a) I > II > III (b) III > I > II
(c) II > III > I (d) I > III > II
(2001)

50. Increasing order of electrophilic substitution for following compounds

(I) 
(II) 

(III) 

(IV) 

(a) IV < I < II < III (b) III < II < I < IV
(c) I < IV < III < II (d) II < III < I < IV
(2000)

51. In Friedel-Crafts reaction, toluene can be prepared by
(a) $C_6H_6+CH_3Cl$ (b) $C_6H_5Cl+CH_4$
(c) $C_6H_6+CH_2Cl_2$ (d) $C_6H_6+CH_3COCl$
(2000)

52. Which reagent converts propene to 1-propanol?
(a) H_2O, H_2SO_4
(b) B_2H_6, H_2O_2, OH^-
(c) $Hg(OAc)_2$, $NaBH_4/H_2O$
(d) Aq. KOH *(2000)*

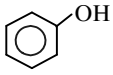
53. Which is maximum stable?
(a) 1-Butene (b) *cis*-2-Butene
(c) *trans*-2-Butene
(d) All have same stability. *(2000)*

54. 2-Butene shows geometrical isomerism due to
(a) restricted rotation about double bond
(b) free rotation about double bond
(c) free rotation about single bond
(d) chiral carbon. *(2000)*

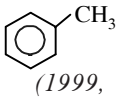
55. Dihedral angle in staggered form of ethane is
(a) 0° (b) 120°
(c) 60° (d) 180° *(2000)*

56. When acetylene is passed through dil. H_2SO_4 in the presence of $HgSO_4$, the compound formed is
(a) acetic acid (b) ketone
(c) ether (d) acetaldehyde
(1999)

57. In Friedel-Craft's alkylation, besides $AlCl_3$ the other reactants are
(a) $C_6H_6+CH_3Cl$ (b) $C_6H_6+CH_4$
(c) $C_6H_6+NH_3$ (d) $C_6H_6+CH_3COCl$
(1999)

58. Which of the following compounds will be most easily attacked by an electrophile?
(a) 

(b) 

(c) 
(d) 

(1999, 1998)

59. Which one of these is not compatible with arenes?
(a) Electrophilic additions
(b) Delocalisation of π-electrons
(c) Greater stability
(d) Resonance *(1998)*

60. 2-Bromopentane is heated with potassium ethoxide in ethanol. The major product obtained is
(a) *trans*-2-pentene (b) 1-pentene
(c) 2-ethoxy pentane (d) 2-*cis*-pentene
(1998)

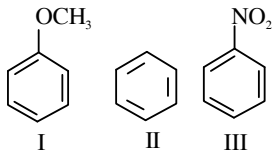
61. Which of the following reaction is expected to readily give a hydrocarbon product in good yields?
(a) $CH_3CH_3 \xrightarrow[h\upsilon]{Cl_2}$
(b) $(CH_3)_2CHCl \xrightarrow{C_2H_5OH}$
(c) $RCOOK \xrightarrow[\text{Oxidation}]{\text{Electrolysis}}$
(d) $RCOOAg \xrightarrow{I_2}$ *(1997)*

62. In a reaction $CH_2 = CH_2 \xrightarrow[\text{acid}]{\text{Hypochlorous}} M \xrightarrow{R} \begin{array}{c} CH_2OH \\ | \\ CH_2OH \end{array}$
where M = Molecule and R = Reagent. M and R are
(a) CH_3CH_2OH and HCl
(b) $CH_2 = CH_2$ and heat
(c) CH_3CH_2Cl and NaOH
(d) $CH_2Cl - CH_2OH$ and aq. $NaHCO_3$
(1997)

63. The cylindrical shape of an alkyne is due to
(a) two sigma C – C and one π C – C bonds
(b) one sigma C – C and two π C – C bonds
(c) three sigma C – C bonds
(d) three π C – C bonds. *(1997)*

64. In the commercial gasolines, the type of hydrocarbons which are more desirable is
(a) linear unsaturated hydrocarbon
(b) toluene
(c) branched hydrocarbon
(d) straight-chain hydrocarbon. *(1997)*

65. Among the following compounds (I-III) the correct reaction with electrophile is



(a) I > II > III (b) I = II > III
(c) II > III > I (d) III < I < II
(1997)

66. The most stable conformation of *n*-butane is
(a) gauche (b) staggered
(c) skew boat (d) eclipsed.
(1997)

67. Electrophile in the case of chlorination of benzene in the presence of $FeCl_3$ is
(a) Cl (b) $FeCl_3$
(c) Cl^+ (d) Cl^- *(1996)*

68. The reaction,
$CH_2 = CH - CH_3 + HBr \rightarrow CH_3CHBr - CH_3$ is
(a) electrophilic substitution
(b) free radical addition
(c) nucleophilic addition
(d) electrophilic addition. *(1996)*

69. Which of the following has zero dipole moment?
(a) 1-Butene (b) 2-Methyl-1-propene
(c) *cis*-2-Butene (d) *trans*-2-Butene
(1996)

70. The alkene $R - CH = CH_2$ reacts readily with B_2H_6 and the product on oxidation with alkaline hydrogen peroxides produces
(a) $R-\underset{\underset{CH_3}{|}}{C}=O$ (b) $R-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH_2}$
(c) $R - CH_2 - CHO$
(d) $R - CH_2 - CH_2 - OH$ *(1995)*

71. One of the following which does not observe the anti-Markownikoff's addition of HBr, is
(a) pent-2-ene (b) propene
(c) but-2-ene (d) but-1-ene
(1994)

72. The reactive species in the nitration of benzene is
(a) NO_3 (b) HNO_3
(c) NO_2^+ (d) NO_2^- *(1994)*

73. $R - CH_2 - CCl_2 - R \xrightarrow{\text{Reagent}} R - C \equiv C - R$
The reagent is
(a) Na (b) HCl in H_2O
(c) KOH in C_2H_5OH (d) Zn in alcohol.
(1993)

74. Reduction of 2-butyne with sodium in liquid ammonia gives predominantly
(a) *cis*-2-butene (b) no reaction
(c) *trans*-2-butene (d) *n*-butane.
(1993)

75. A compound is treated with $NaNH_2$ to give sodium salt. Identify the compound.
(a) C_2H_2 (b) C_6H_6
(c) C_2H_6 (d) C_2H_4 *(1993)*

76. Reactivity of hydrogen atoms attached to different carbon atoms in alkanes has the order
(a) tertiary > primary > secondary
(b) primary > secondary > tertiary
(c) both (a) and (b)
(d) tertiary > secondary > primary. *(1993)*

77. Which is the correct symbol relating the two Kekule structures of benzene?
(a) $\rightleftharpoons$ (b) $\longrightarrow$
(c) $\equiv$ (d) $\longleftrightarrow$
(1993)

78. Select the true statement about benzene amongst the following
(a) because of unsaturation benzene easily undergoes addition
(b) there are two types of C – C bonds in benzene molecule
(c) there is cyclic delocalisation of π-electrons in benzene
(d) monosubstitution of benzene gives three isomeric products. *(1992)*

79. Acetylenic hydrogens are acidic because
(a) sigma electron density of C – H bond in acetylene is nearer to carbon, which has 50% *s*-character
(b) acetylene has only open hydrogen in each carbon
(c) acetylene contains least number of hydrogens among the possible hydrocarbons having two carbons
(d) Acetylene belongs to the class of alkynes with molecular formula, C_nH_{2n-2}. *(1989)*

80. Which is the most suitable reagent among the following to distinguish compound (3) from rest of the compounds?
(1) $CH_3 - C \equiv C - CH_3$
(2) $CH_3 - CH_2 - CH_2 - CH_3$
(3) $CH_3 - CH_2C \equiv CH$
(4) $CH_3 - CH = CH_2$
(a) Bromine in carbon tetrachloride
(b) Bromine in acetic acid
(c) Alk. $KMnO_4$
(d) Ammoniacal silver nitrate. *(1989)*

Answer Key

1.	(a)	**2.**	(c)	**3.**	(c)	**4.**	(d)	**5.**	(a)	**6.**	(d)	**7.**	(c)	**8.**	(c)	**9.**	(a)	**10.**	(b)
11.	(d)	**12.**	(b)	**13.**	(c)	**14.**	(c)	**15.**	(a)	**16.**	(c)	**17.**	(d)	**18.**	(c)	**19.**	(a)	**20.**	(b)
21.	(a)	**22.**	(d)	**23.**	(c)	**24.**	(a)	**25.**	(a)	**26.**	(a)	**27.**	(b)	**28.**	(b)	**29.**	(c)	**30.**	(d)
31.	(d)	**32.**	(d)	**33.**	(d)	**34.**	(d)	**35.**	(d)	**36.**	(d)	**37.**	(c)	**38.**	(d)	**39.**	(a)	**40.**	(b)
41.	(c)	**42.**	(d)	**43.**	(b)	**44.**	(a)	**45.**	(d)	**46.**	(b)	**47.**	(b)	**48.**	(b)	**49.**	(b)	**50.**	(a)
51.	(a)	**52.**	(b)	**53.**	(c)	**54.**	(a)	**55.**	(c)	**56.**	(d)	**57.**	(a)	**58.**	(a)	**59.**	(a)	**60.**	(a)
61.	(c)	**62.**	(d)	**63.**	(b)	**64.**	(c)	**65.**	(a)	**66.**	(b)	**67.**	(c)	**68.**	(d)	**69.**	(d)	**70.**	(d)
71.	(c)	**72.**	(c)	**73.**	(c)	**74.**	(c)	**75.**	(a)	**76.**	(d)	**77.**	(d)	**78.**	(c)	**79.**	(a)	**80.**	(d)