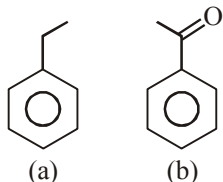


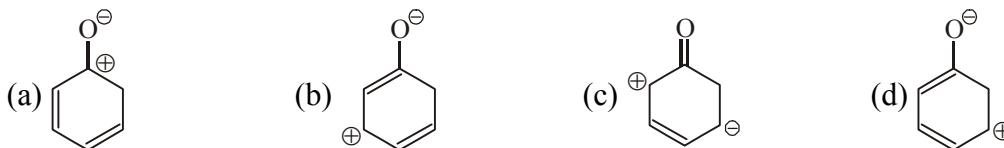
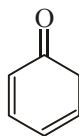
GOC

1. Determine the inductive effect of phenyl ring on attached group in the (a) and (b) molecules respectively

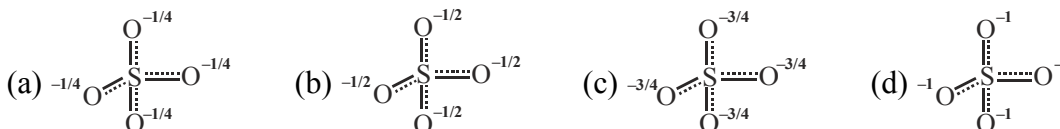
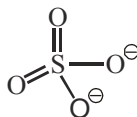


- (a) a : +I, b : +I (b) a : -I, b : +I (c) a : +I, b : -I (d) a : -I, b : -I

2. Which is the least stable resonating structure of the given molecule?



3. Identify the resonance hybrid of the given ion :



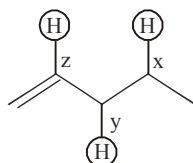
4. Which of the following is the most stable?



5. Which of the following has minimum heat of hydrogenation?

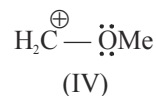
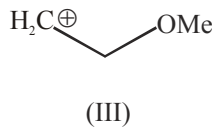
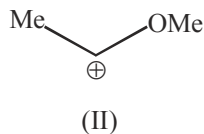
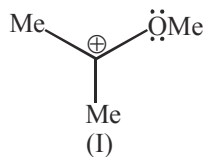


6. The decreasing order of bond dissociation energies amongst the C-H bonds labelled x, y, z (in homolysis) is:



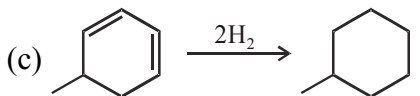
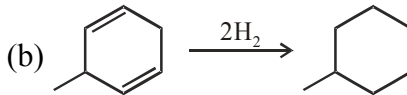
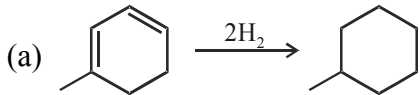
- (a) $x > y > z$ (b) $x > z > y$ (c) $z > x > y$ (d) $y > z > x$

7. Determine the stability order of given intermediates.



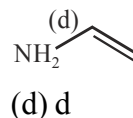
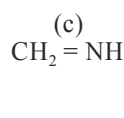
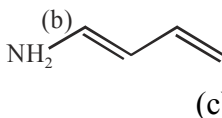
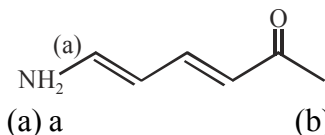
(a) I > II > III > IV (b) I > II > IV > III (c) IV > I > II > III (d) III > I > II > IV

8. Rank the following reactions in DECREASING order of heat of hydrogenation.

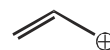
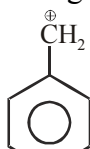
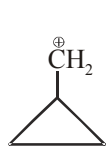


(a) a > c > b (b) c > a > b (c) a > b > c (d) b > c > a

9. Which of the following bonds is the longest ?

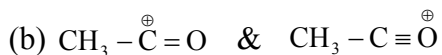


10. What is the correct order of stability among the given carbocations?

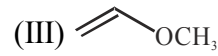
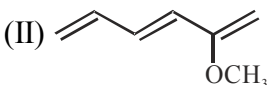
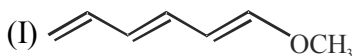


(a) II > I > IV > III (b) II > I > III > IV (c) I > II > IV > III (d) I > II > III > IV

11. Which of the following are not resonating structures of each other?

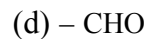
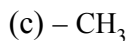
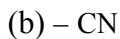
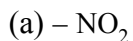


12. Find correct order of resonance energy for



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

13. Which of the following substituents will decrease the acidic strength of phenol?



14. Correct order of stability of carbocations:

- (i) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2^\oplus$ (ii) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CH}_2^\oplus$ (iii) $\text{CH}_3 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \text{CH}_2^\oplus$
- (a) (iii) > (ii) > (i) (b) (ii) > (iii) > (i) (c) (i) > (iii) > (ii) (d) (i) > (ii) > (iii)

15. Which of the following is an aromatic specie?



16. Which is not a valid resonating structure of $\text{H}_2\text{C}=\text{CH}-\text{CH}=\text{CH}-\text{O}-\text{CH}_3$?

- (a) $\text{H}_2\text{C}=\overset{\ominus}{\text{C}}\text{H}=\text{CH}-\overset{\oplus}{\text{O}}-\text{CH}_3$ (b) $\text{H}_2\text{C}=\text{CH}-\overset{\oplus}{\text{O}}=\text{CH}-\overset{\ominus}{\text{C}}\text{H}-\text{CH}_3$
- (c) $\text{H}_2\text{C}=\text{CH}-\overset{\ominus}{\text{C}}\text{H}-\overset{\oplus}{\text{O}}-\text{CH}_3$ (d) $\text{H}_3\text{C}-\overset{\ominus}{\text{O}}-\overset{\oplus}{\text{C}}\text{H}-\text{CH}=\text{CH}-\overset{\oplus}{\text{C}}\text{H}_2$

17. What is C – O bond order for $\text{H}_3\text{C}-\text{CH}_2-\overset{\ominus}{\text{C}}=\overset{\oplus}{\text{O}}$?

- (a) 2 (b) 1.5 (c) 0.5 (d) 1

18. Solubility order in H_2O for the following compounds is :

- (I) $\text{H}_2\text{C}(\text{OH})-\text{CH}(\text{OH})-\text{CH}(\text{OH})-\text{CH}_2(\text{OH})$ (II) $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2(\text{OH})$
- (III) $\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_3$
- (a) I > III > II (b) I > II > III (c) II > III > I (d) III > II > I

19. Which of the following alkene has minimum heat of hydrogenation.



20. Which is more stable?

- (I) $\text{CH}_3 - \overset{\oplus}{\text{C}} - \text{CH}_3$ (II) $\text{CD}_3 - \overset{\oplus}{\text{C}} - \text{CD}_3$
- (a) I > II (b) II > I (c) I = II (d) Stability can't be predicted

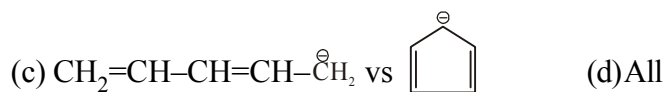
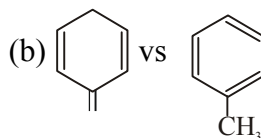
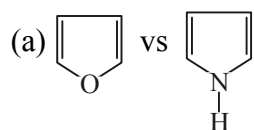
21. Which of the isomer of C_4H_8 is most stable?



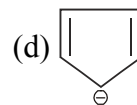
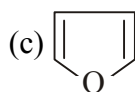
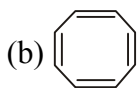
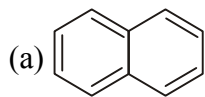
22. Which one of the following will have the longest C=C bond length?



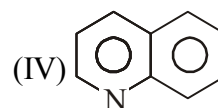
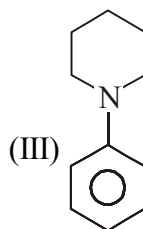
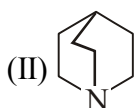
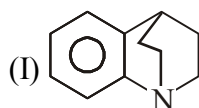
23. In which of the following, the 2nd structure has more resonance energy.



24. Which compound has identical C-C bond length?



25. Which compound is most basic among the following?



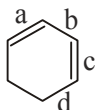
(a) I

(b) II

(c) III

(d) IV

26. What is bond length order ?



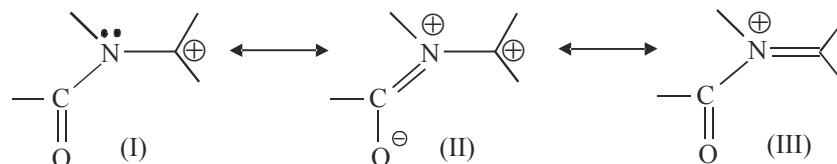
(a) $d > b > a = c$

(b) $d > a = b = c$

(c) $b = d > a = c$

(d) $d < a = b = c$

27. Increasing order of stability of following resonating structures is :



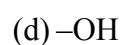
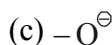
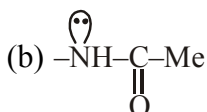
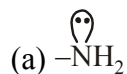
(a) $\text{I} < \text{II} < \text{III}$

(b) $\text{III} < \text{II} < \text{I}$

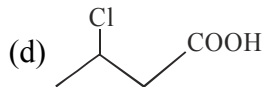
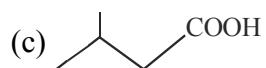
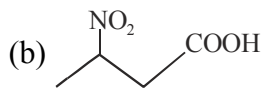
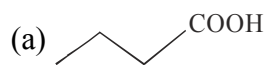
(c) $\text{II} < \text{III} < \text{I}$

(d) $\text{II} < \text{I} < \text{III}$

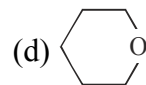
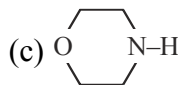
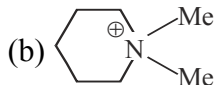
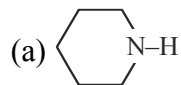
28. Which group has greater +M effect than $\left(-\text{N} \begin{array}{c} \diagup \\ \diagdown \end{array} \text{C}_6\text{H}_4 \right)$?



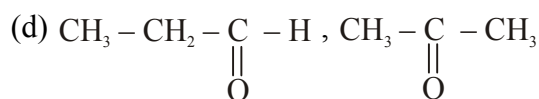
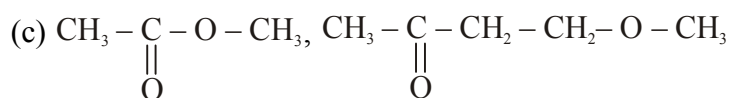
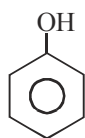
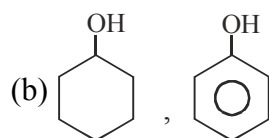
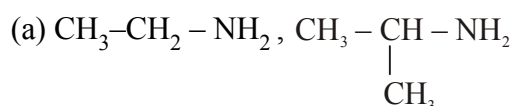
29. Which of the following will have lowest dissociation constant (K_a)?



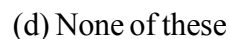
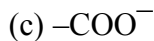
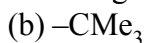
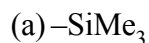
30. Select the one which is most basic among the following:



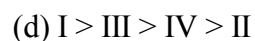
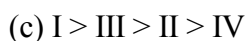
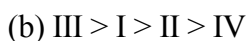
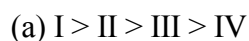
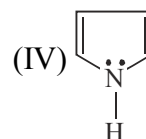
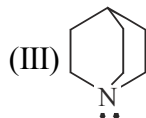
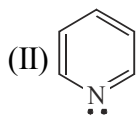
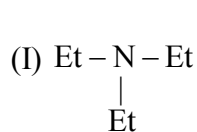
31. Which of the following pair having same functional group?



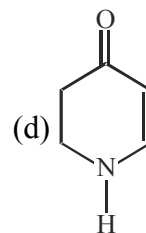
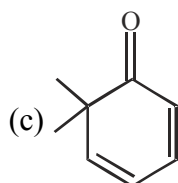
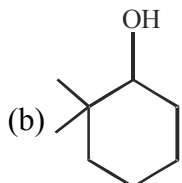
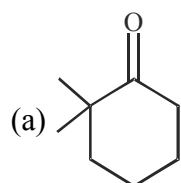
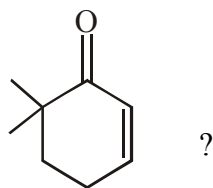
32. Which of the following is not +I group?

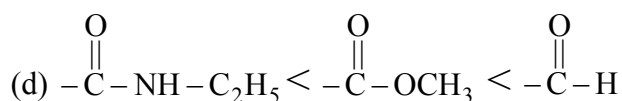
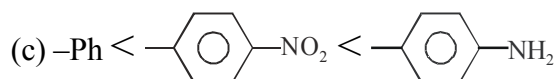


33. The correct order of decreasing basicity of the compounds is:



34. Which compound has lesser C-O bond length in comparison to C-O bond length in





41. 1 mol of which compound can release maximum heat when it reacts with air?

- (a) E-cyclo decene (b) Z-cyclo decene
(c) E-cyclo pentadecene (d) Z-cyclo pentadecene

42. Which of the following is a +I group?

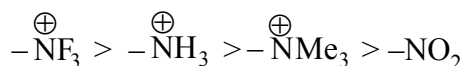


43. Which of the following statement is correct?

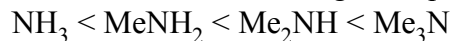
(a) The relative order of + I groups is



(b) The relative order of - I groups is

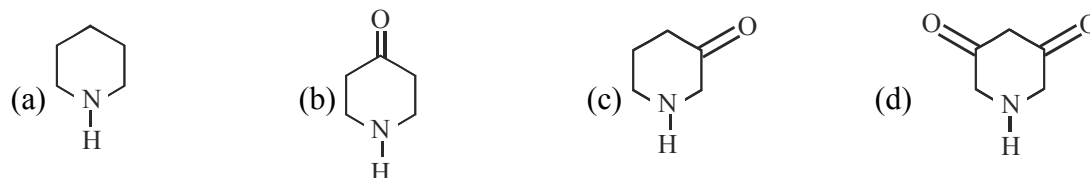


(c) The relative order of basic strength in aqueous solution is

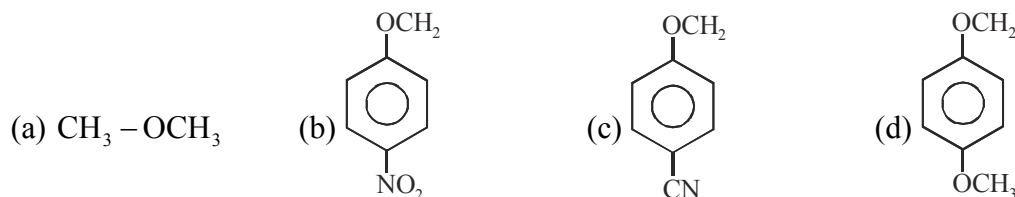


(d) None of these

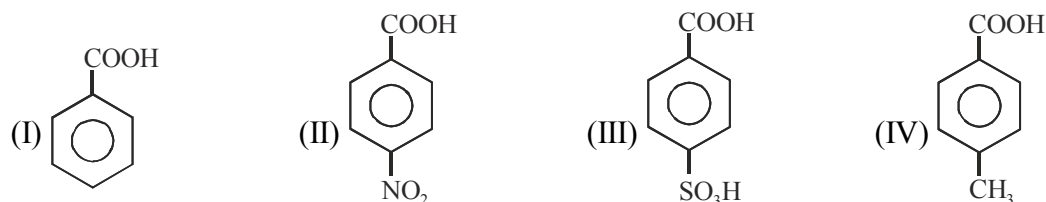
44. Which of the following compound is least basic?



45. Which of the following is least stable carbanion?

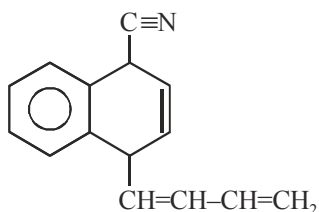


46. Arrange the following in decreasing order of acidic strength.



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

47. Find the number of sp^2 hybridised atoms in the following compound.

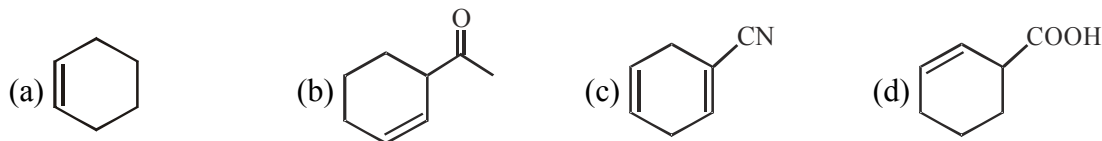


- (a) 12 (b) 14 (c) 15 (d) 11

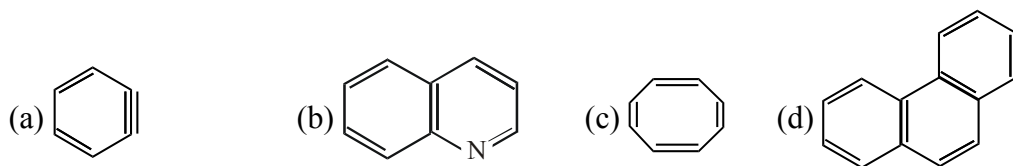
48. Which of the following resonating structure is most stable?

- (a) $\text{CH}_3 - \ddot{\text{O}} - \text{CH} = \text{CH} - \overset{\oplus}{\text{C}}\text{H}_2$ (b) $\text{CH}_3 - \overset{\oplus}{\text{O}} - \overset{\oplus}{\text{C}}\text{H} - \text{CH} = \text{CH}_2$
 (c) $\text{CH}_3 - \overset{\oplus}{\text{O}} - \overset{\oplus}{\text{C}}\text{H} - \overset{\ominus}{\text{C}}\text{H} - \overset{\oplus}{\text{C}}\text{H}_2$ (d) $\text{CH}_3 - \overset{\oplus}{\text{O}} = \text{CH} - \text{CH} = \text{CH}_2$

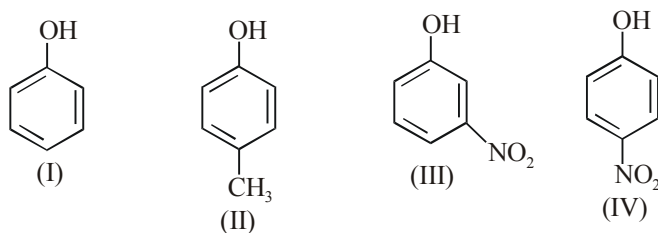
49. Which of the following can show resonance with the alkene?



50. Which of the following is non-aromatic?



51. In the following compounds:



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

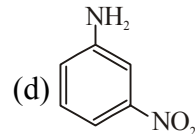
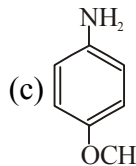
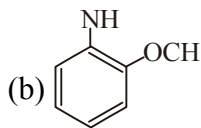
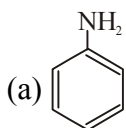
52. Which of the following compound is most basic?



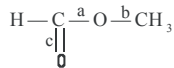
53. Select the incorrect statement for

- (a) 4π electrons are participating in resonance (b) Compound is anti aromatic
 (c) It is a Homocyclic compound (d) Compound is non aromatic

54. Which of the following is most basic?



55. What is correct order for bond length for mentioned bonds?



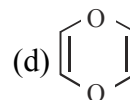
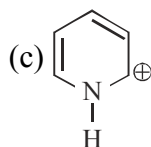
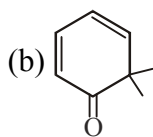
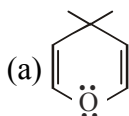
(a) $a = b = c$

(b) $c > a > b$

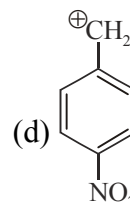
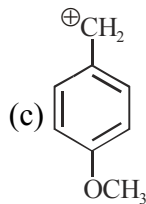
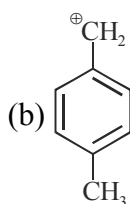
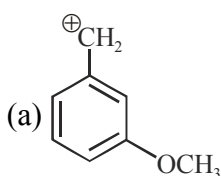
(c) $b > c > a$

(d) $b > a > c$

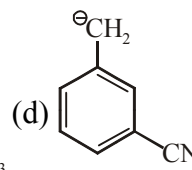
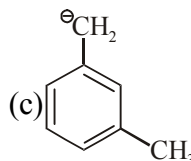
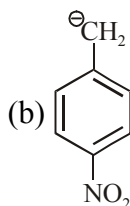
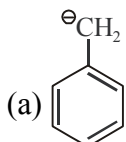
56. Which specie is aromatic?



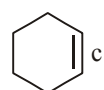
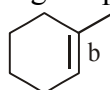
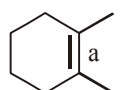
57. Most stable carbocation amongst the following is :



58. Least stable carbanion amongst the following is :



59. Consider following compounds:



Which bond is strongest?

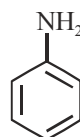
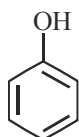
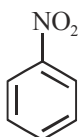
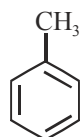
(a) a

(b) b

(c) c

(d) Can not be predicted

60. Which compound has highest electron density in benzene ring?



(I)

(II)

(III)

(IV)

(a) I

(b) III

(c) IV

(d) II

61. Which of the following is most basic compound ?

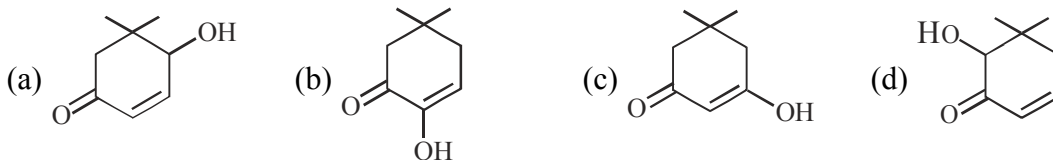
(a) $\text{H}_3\text{C}-\text{C}\equiv\text{N}$

(b) $\text{H}_3\text{C}-\text{CH}=\text{NH}$

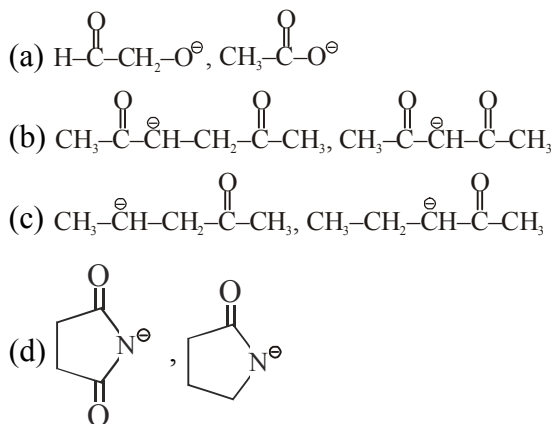
(c) $\text{H}_3\text{C}-\text{C}=\text{N}^\ominus$

(d) $\text{H}_2\text{C}=\text{C}=\text{N}^\ominus$

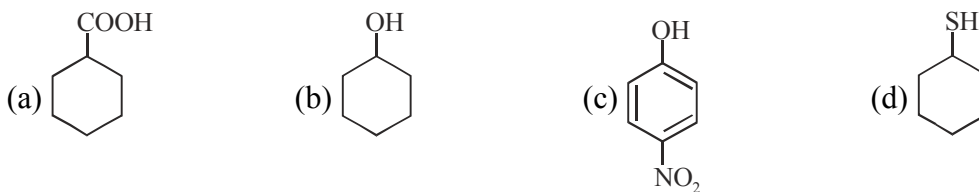
62. Which of the following compound has least value of pK_a ?

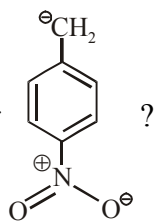


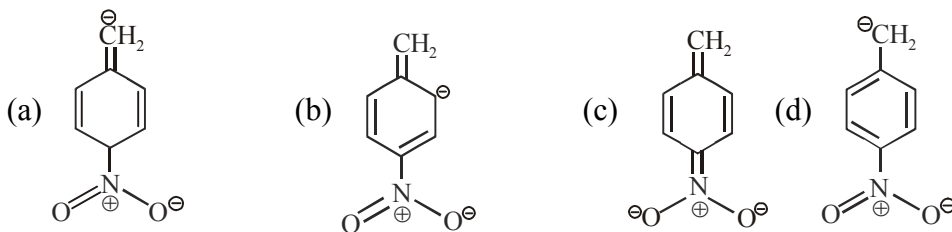
63. In which pairs, specie-I is more stable than specie-II?



64. Which of the following is least acidic compound?



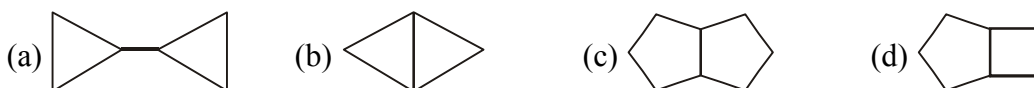
65. Which resonating structure is most stable for  ?



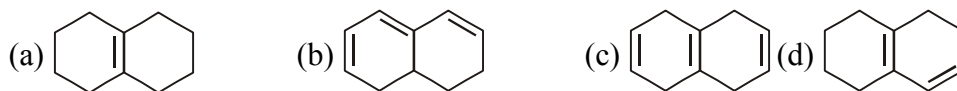
66. Which of the following alkene is least stable?



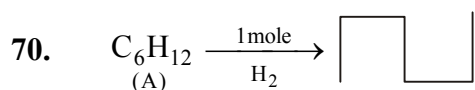
67. Heat of combustion is be maximum for



68. Which of the following has the highest heat of hydrogenation ?



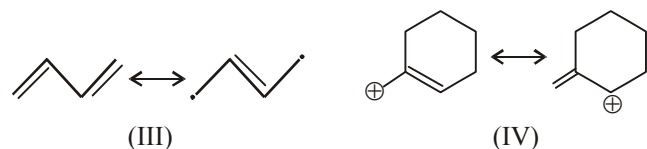
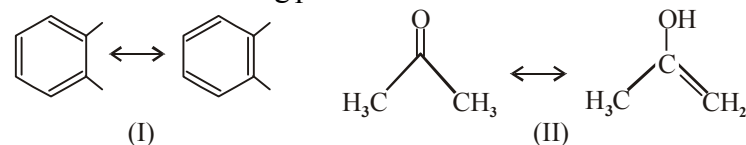
69. Which of the following carbanion is most stable ?



Which isomer of A has maximum heat of combustion?

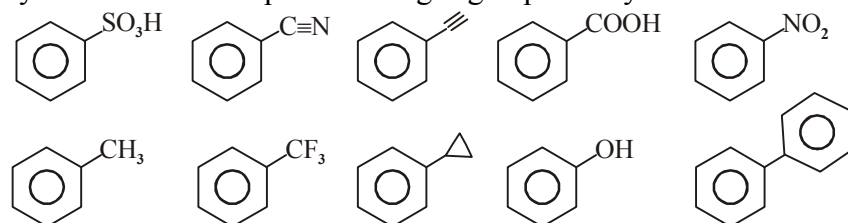


71. Which of the following pairs are resonance structures of each other?



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

72. 'y' = Number of compound having -I group directly attached to benzene.



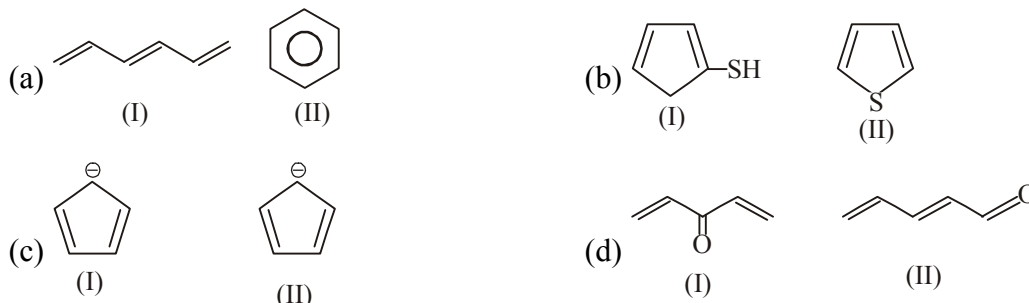
Find the value of 'y'?

(a) 5 (b) 6 (c) 7 (d) 8

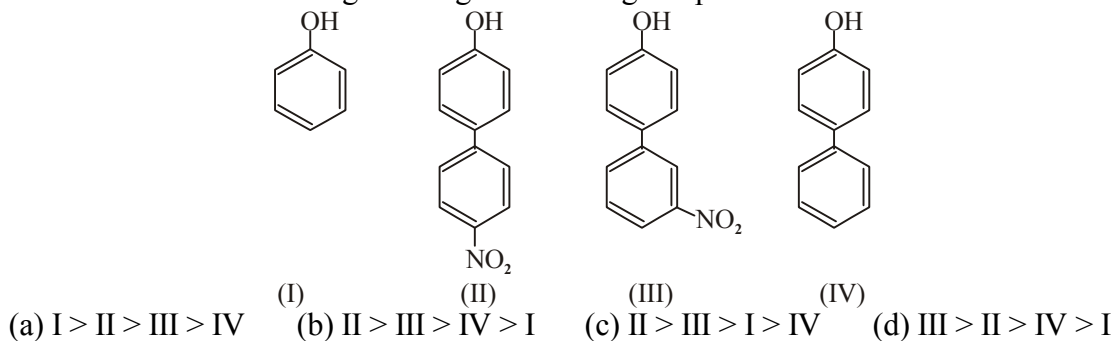
73. Which of the following is not an aromatic compound?



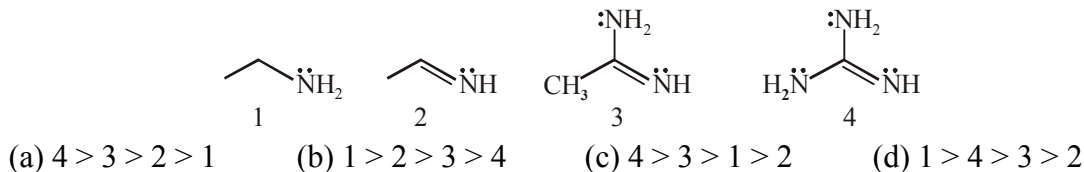
74. In which of the following pair Ist compound has more resonance energy than IInd compound?



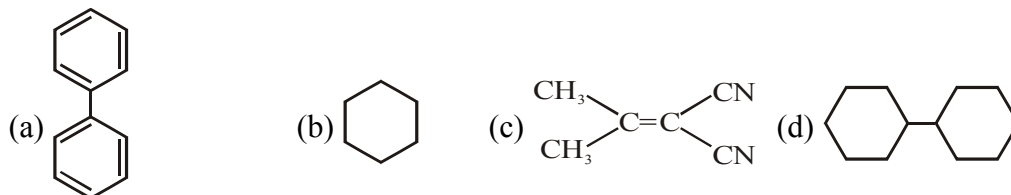
75. Correct order of acidic strength among the following compounds is



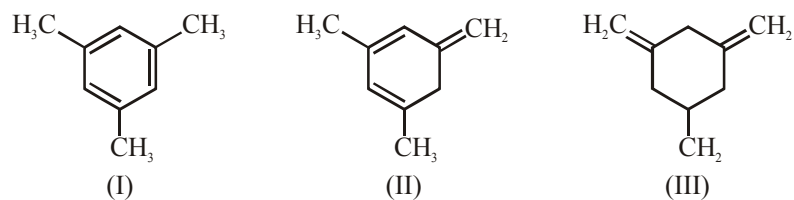
76. Correct order of Basic Strength (Kb order) is :



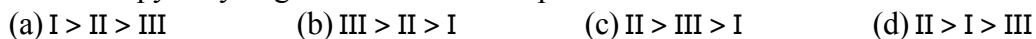
77. In which of the following molecules, all atoms are coplanar?



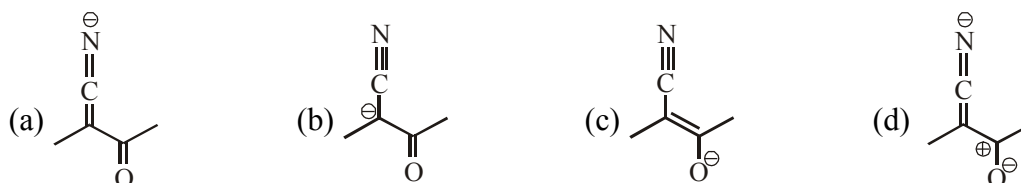
78.



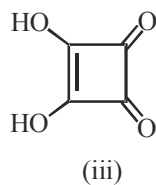
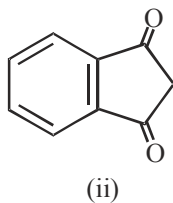
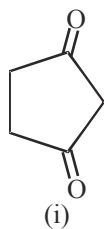
The enthalpy of hydrogenation of these compounds will be in the order as



79. Which among the given resonance structures is the most stable ?

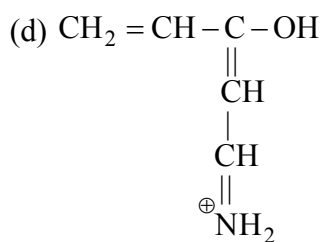
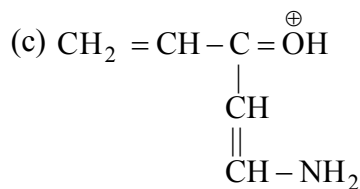
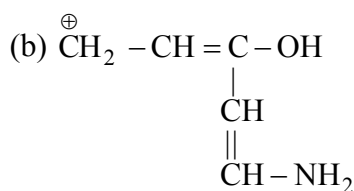
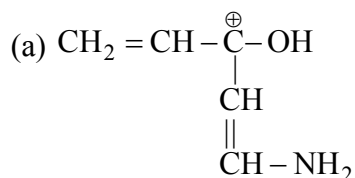


80. Determine the correct order of acidity of the following compounds.

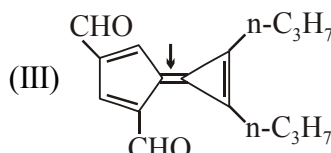
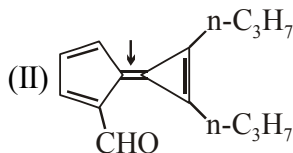
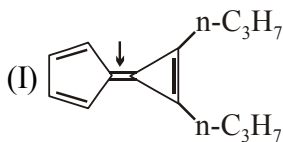


- (a) $i > ii > iii$ (b) $ii > iii > i$ (c) $iii > i > ii$ (d) $iii > ii > i$

81. Which of the following is most stable resonance structure?



82. Compare rotational energy barrier about indicated C=C between given compounds.

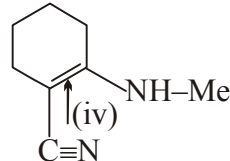
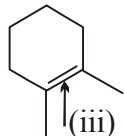
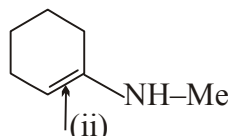
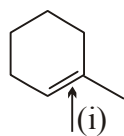


- (a) $I > II > III$ (b) $III > II > I$ (c) $III > I > II$ (d) $I = II = III$

83. Which of the following is correct order of $-I$?

- (a) $-\text{F} > -\text{NO}_2 > -\text{CN} > \text{Br}$ (b) $-\overset{\oplus}{\text{N}}\text{H}_3 > \text{NO}_2 > -\text{CN} > -\overset{\oplus}{\text{C}}\text{H}$
 (c) $-\overset{\oplus}{\text{N}}\text{H}_3 > -\overset{\oplus}{\text{N}}\text{H}_2\text{Me} > -\overset{\oplus}{\text{N}}\text{HMe}_2 > -\overset{\oplus}{\text{N}}\text{Me}_3$ (d) $-\text{NH}_2 > -\text{OH} > -\text{Cl} > -\overset{\oplus}{\text{C}}\text{H}(\text{O})\text{Br}$

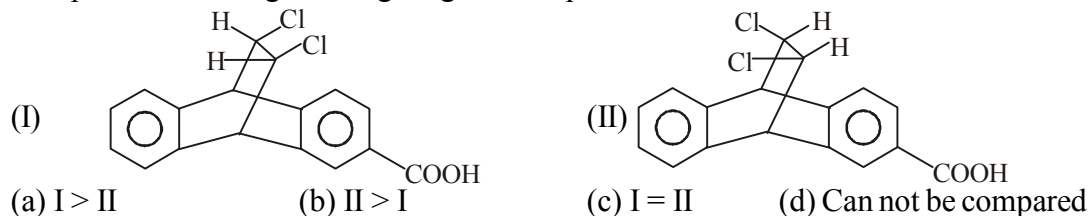
84. Compare bond length of the indicated bond.



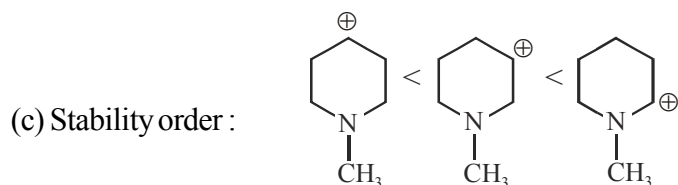
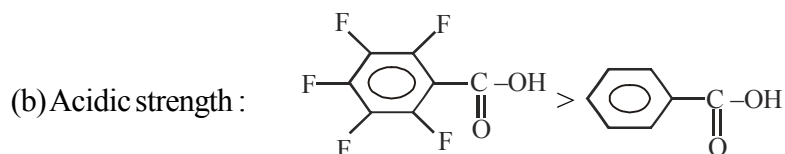
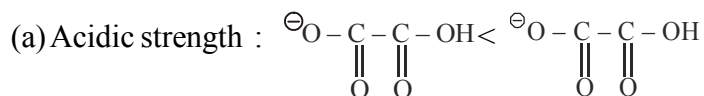
- (a) $(i) > (ii) > (iii) > (iv)$ (b) $(iv) > (iii) > (ii) > (i)$
 (c) $(iv) > (ii) > (iii) > (i)$ (d) $(i) > (iii) > (ii) > (iv)$

85. Which amongst the following has the most extensive hydrogen bonding in aqueous medium?
 (a) Ethanol (b) Acetaldehyde (c) Acetone (d) Acetic acid

86. Compare acidic strength among the given compounds.

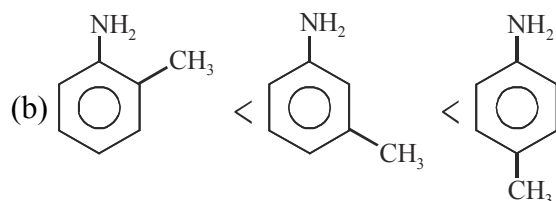


87. Which of the order is incorrect?



(d) Basic Strength order : $\text{Et}_2\text{NH} > \text{Et}_3\text{N} > \text{Et}-\text{NH}_2 > \text{NH}_3$ (In H_2O)

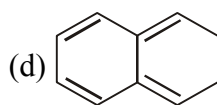
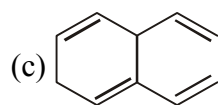
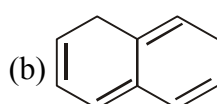
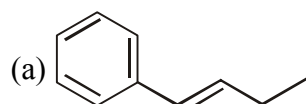
88. The correct order of basic strength for the following bases is / are :



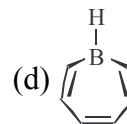
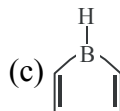
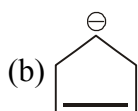
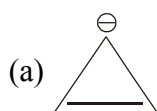
(c) Both are correct

(d) Both are incorrect

89. Which of the following has highest heat of hydrogenation?



90. Which of the following is aromatic ?



91. Which of the following statement is incorrect?

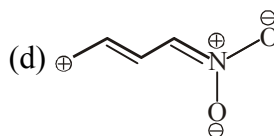
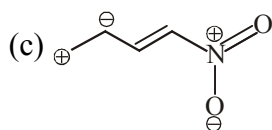
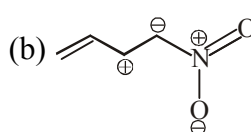
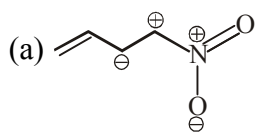
(a) p-nitro phenol is more acidic than p-flouro phenol.

(b) $-\overset{\oplus}{\text{N}}\text{F}_3$ is stronger $-I$ group than $-\overset{\oplus}{\text{N}}\text{H}_3$

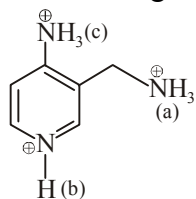
(c) Acidity order : o-nitrobenzoic acid > p-nitrobenzoic acid > m-nitrobenzoic acid

(d) Acidity order : $\text{H}_3\text{C}-\text{COOH} > \text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$

92. Among the following, the least stable canonical structure is :



93. Find the correct acidic strength order :



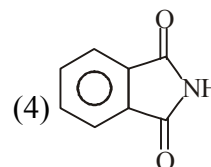
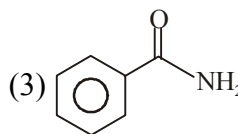
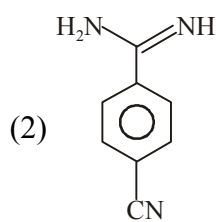
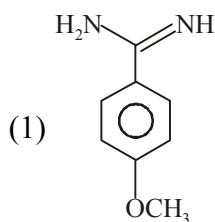
(a) $a > b > c$

(b) $c > b > a$

(c) $b > c > a$

(d) $c > a > b$

94. The correct order of basic strength of the following compounds is

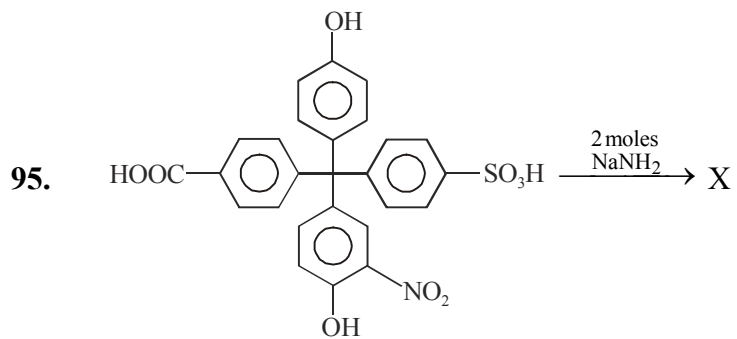


(a) $1 > 2 > 3 > 4$

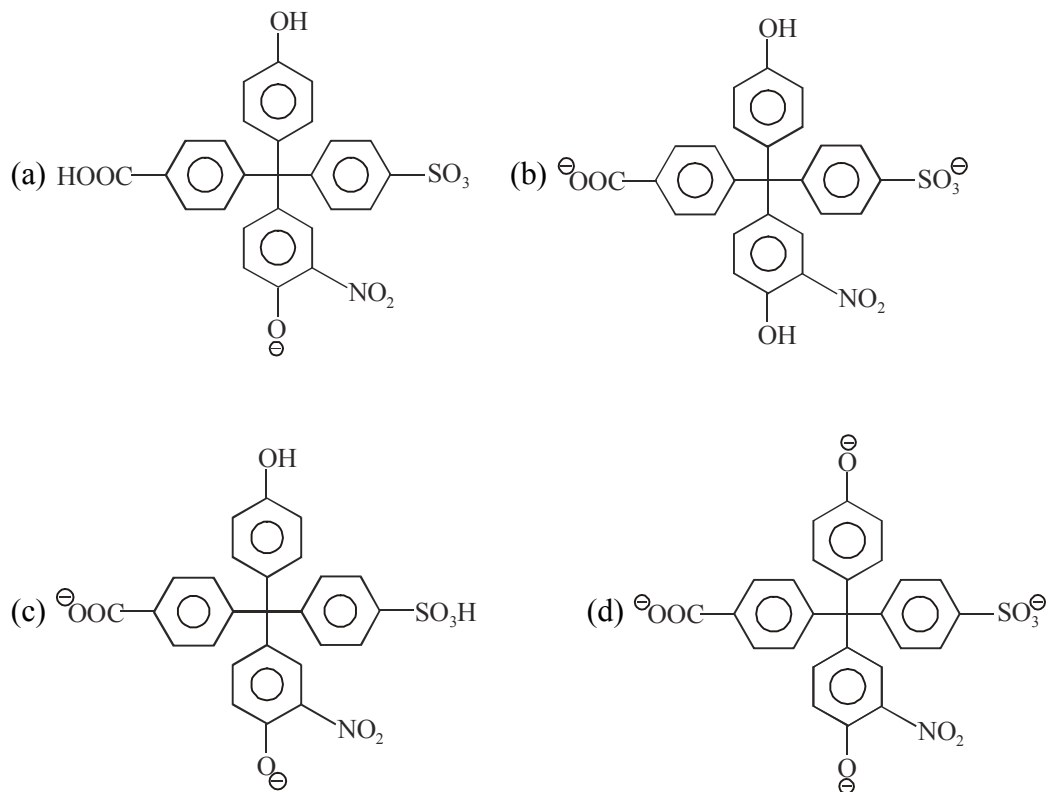
(b) $2 > 1 > 3 > 4$

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

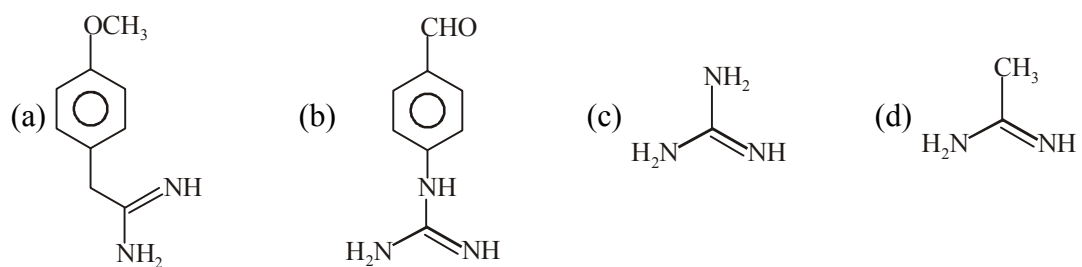
(d) $1 > 3 > 2 > 4$



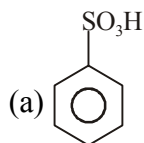
The product X will be



96. Identify the compound having highest basic strength.



97. Which of the following compounds will have highest thermodynamic acidic strength?

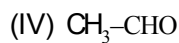
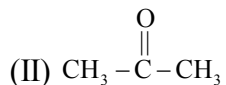
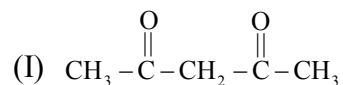


(b) p-nitro phenol

(c) p-Sulpho Benzoic acid

(d) 2,4-Dinitro phenol

98. Arrange the compounds in decreasing acidic strength order:



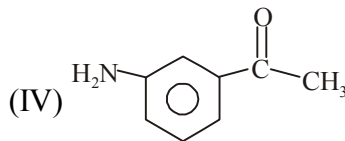
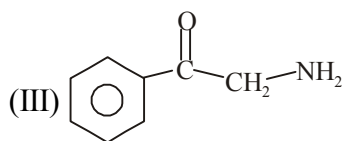
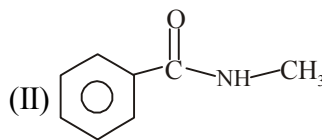
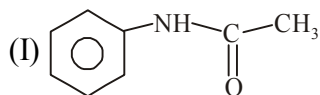
(a) I > IV > III > II

(b) I > IV > II > III

(c) III > I > IV > II

(d) II > IV > I > III

99. The correct basic strength order of the following bases is:



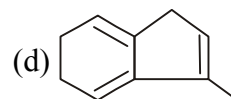
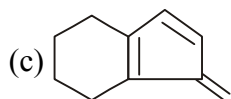
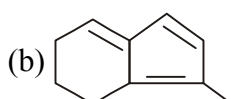
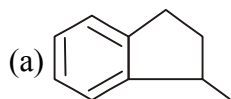
(a) I > II > IV > III

(b) IV > III > II > I

(c) III > II > IV > I

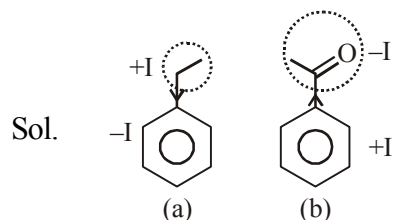
(d) III > IV > II > I

100. Which of the following hydrocarbon is most acidic ?

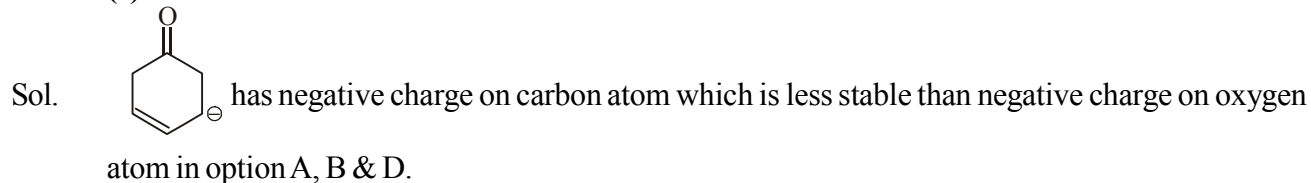


ANSWER AND SOLUTION

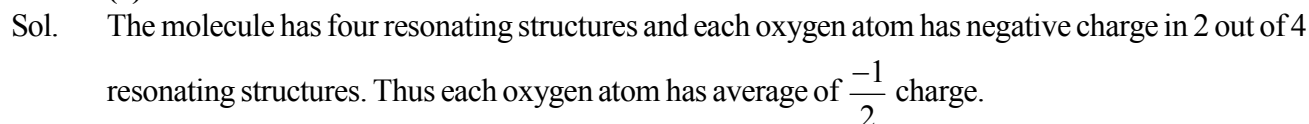
1. (b)



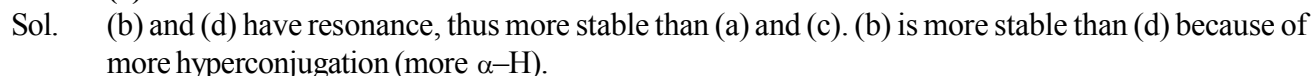
2. (c)



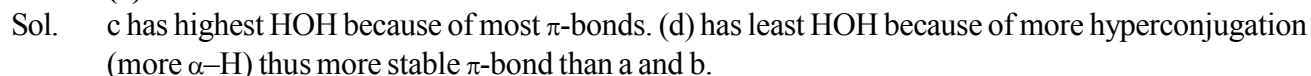
3. (b)



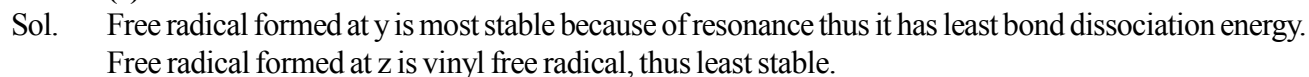
4. (b)



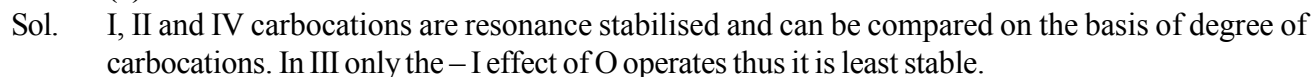
5. (d)



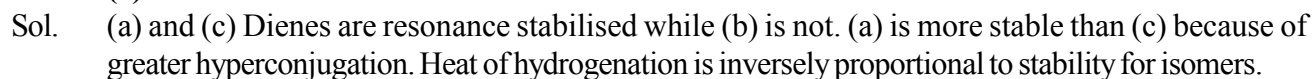
6. (c)



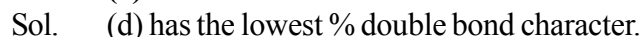
7. (b)



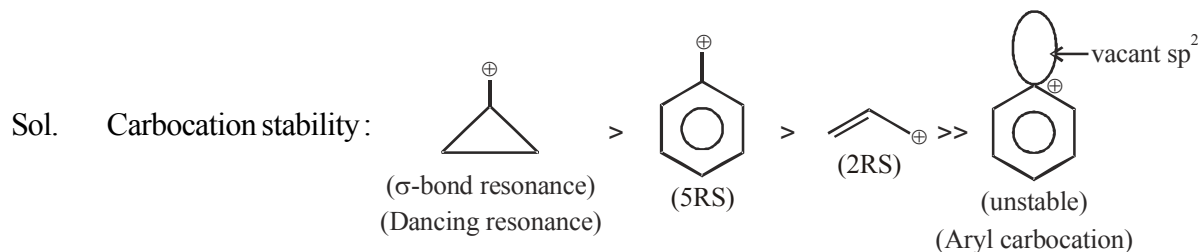
8. (d)



9. (d)



10. (c)



11. (a)

Sol. First pair is not resonating structure because the position of atoms is not same.

12. (c)

Sol. The order of resonance energy is I > II > III greater the resonance, greater will be resonance energy and thus III has the lowest resonance energy then I (Extended resonance) > II (cross resonance).


13. (c)

Sol. Acidic strength of phenol will decrease when electron releasing group will be substituted.

14. (d)

Sol. Greater the number of hyperconjugation greater will be the stability of carbocation.

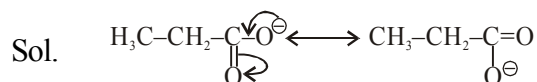
15. (a)

Sol.  is an aromatic compound since it is cyclic planar, conjugated system and follow Huckel's rule. It has $(4n + 2) \pi$ - electron where $n = 1$

16. (b)

Sol. Structure can not be changed in resonance.

17. (b)



$$\text{Bond order} = \frac{\text{Number of bonds between atoms}}{\text{Resonating structures}} = \frac{3}{2} = 1.5$$

18. (b)

Sol. More the hydroxy groups, more is H-bonding with solvent water and thus more is the solubility.

19. (c)

Sol. $\text{HOH}_{\text{hyd.}} \propto \frac{1}{\text{stability}}$

(1) 3 α H (2) 6 α H (3) 10 α H (4) 4 α H
HOH (1 > 4 > 2 > 3)

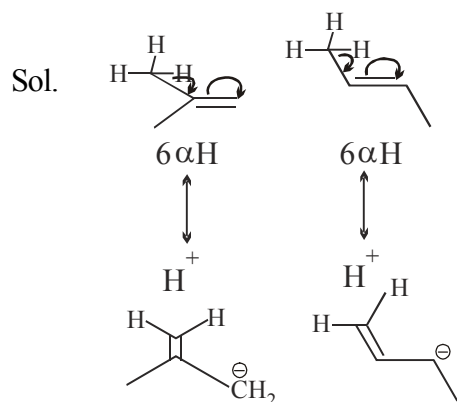
20. (a)

Sol. (I) 9 α H (II) 9 α D

Bond strength order : C – D > C–H

+H order : C – D < C–H

21. (d)



Hyperconjugation structures of isobutene and trans-2-butene respectively have 1° anion and 2° anion, 1° anion is more stable than 2° anion.

22. (c)

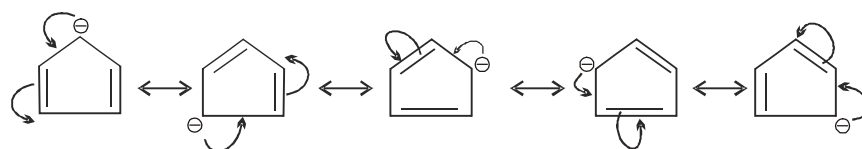
Sol. more α -hydrogen, more will be the hyperconjugation, more will be the [C=C] bond length. i.e. it will have more single bond character

23. (d)

Sol. In (a) N is better donor than O due to lesser electronegativity. In (b) and (c), the second compound is aromatic.

24. (d)

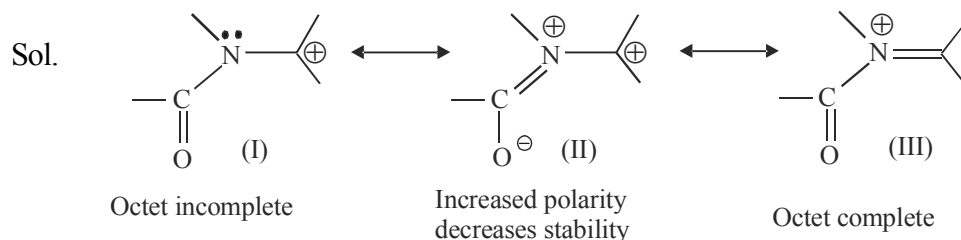
Sol. Compound has identical C – C bond length as the negative charge participates in resonance and molecule is aromatic.




25. (b)
Sol. (b) It is most base as the lone pair of N is not delocalised and also the N atom is sp^3 hybridised.

26. (a)
Sol. Partial double bond character appears in bond **b** due to resonance while there will be pure predominantly double bond character single bond character in d bond.

27. (d)



28. (c)
Sol. $-O^\ominus$ has greater (+M) effect due to greater charge density.

29. (c)
Sol.  is weakest acid among given acids & weakest acid will have lowest K_a value.

30. (a)
Sol. (a) is the most basic due to highest electron density availability for donation.

31. (a)
Sol. In structure (a) 1° -amine is present. So both figures are same.

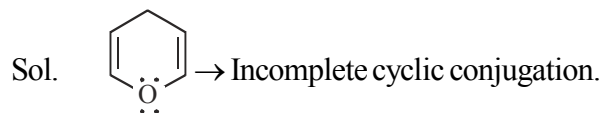
32. (d)
Sol. All the groups show +I effect.

33. (b)
Sol. In (III), lone pair present in sp^3 hybridisation 'N' atom so not delocalised.
In (I), bulky group present on sp^3 hybridisation 'N' atom.
In (II), lone pair present on sp^2 hybridisation 'N' atom.
In (IV), lone pair present in aromatic compound so least basic.

34. (a)
Sol. (a) has shorter C–O bond length due to pure double bond.

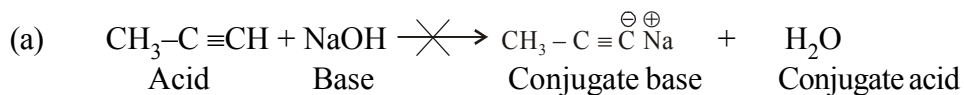
35. (c)
Sol. III and IV are carboxylic acids, thus more acidic than I and II.
I and II
III > IV due to $-M$ of $-NO_2$ in III
II > I due to resonance stabilised phenoxide ion.

36. (c)



37. (d)

Sol. Strong acid + Strong base | weak conjugate acid + weak conjugate base. For forward direction reaction conjugate acid-base should be weaker than acid-base on left hand side.



Acidic strength $\text{CH}_3\text{-C}\equiv\text{CH} < \text{H}_2\text{O}$

Basic strength : $\text{NaOH} < \text{CH}_3\text{-C}\equiv\overset{\ominus}{\text{C}}\overset{\oplus}{\text{Na}}$

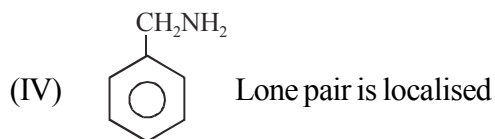
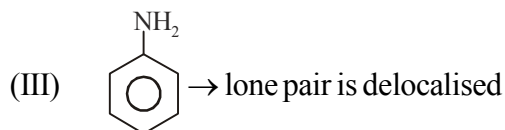
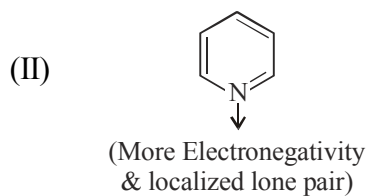
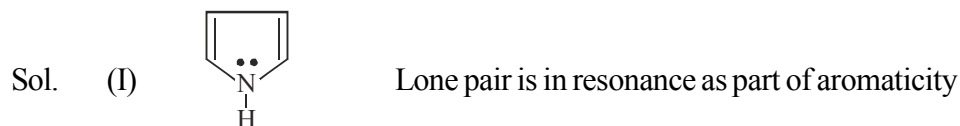
Spontaneous in backward direction

(b) Acidic strength $\text{CH}_4 < \text{H}_2\text{O}$ in (Reaction backward direction)

(c) Acidic strength $\text{Ph-OH} < \text{H}_2\text{CO}_3$ (Reaction in backward direction)

(d) Acidic strength $\text{H}_2\text{O} > \text{EtOH}$ (Reaction in forward direction)

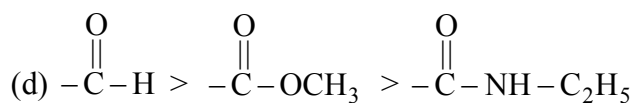
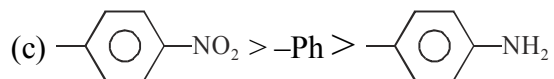
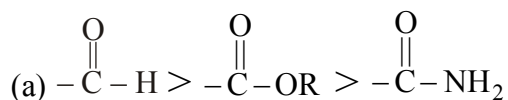
38. (d)



39. (a)

Sol. As -CHO group is -M, the +M group will decrease C-C bond length, by increasing the double bond character.

40. (d)
Sol. -M strength order



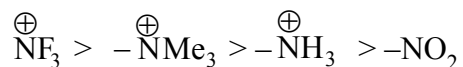
41. (d)
Sol. HOC \propto number of CH₂ units

$$\propto \frac{1}{\text{stability}}$$

Also for ring size greater than 11, cis form is less stable than trans.

42. (d)
Sol. (a), (b), (c) have -I effect. In 'd' due to strong +I of -O⁻, it has +I effect.

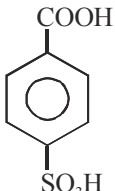
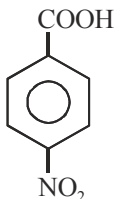
43. (d)
Sol. (a) The relative order of +I groups is $\overset{\ominus}{\text{C}}\text{H}_2 > \text{ -}\overset{\ominus}{\text{N}}\text{H} > \text{ -}\overset{\ominus}{\text{O}}$
(b) The relative order of -I groups is



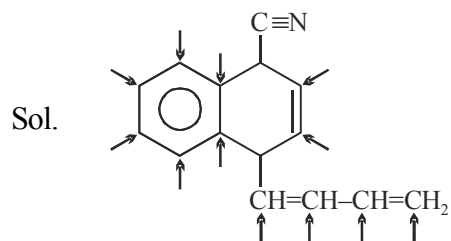
(c) The relative order of basic strength in aqueous solution is
 $\text{Me}_2\text{NH} > \text{MeNH}_2 > \text{Me}_3\text{N} > \text{NH}_3$

44. (d)
Sol. It is least basic due to maximum -I effect.

45. (a)
Sol. In first compound the negative charge is not in resonance.

46. (c)
Sol.  is more acidic than  because of highly acidic -SO₃H group.

47. (a)



48. (d)

Sol. (d) Complete octet RS

49. (c)

Sol. Only in (c) the alkene is in conjugation.

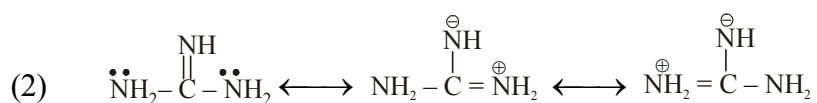
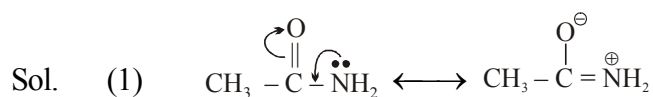
50. (c)

Sol. (c) Cyclooctatetraene is non-aromatic due to non-planar tub shape.

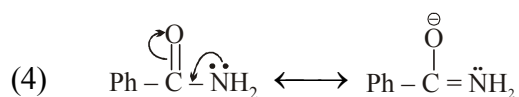
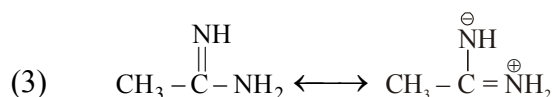
51. (d)

Sol. II : (+I) and (+H) of CH_3 , III : (-I) of NO_2 , IV : (-M) and (-I) of NO_2 .

52. (b)



More basic due to 3 equivalent RS in conjugat acid.



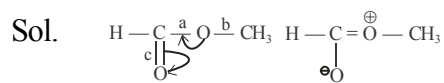
53. (b)

Sol. as the compound is not completely conjugated, therefore it is non aromatic.

54. (c)

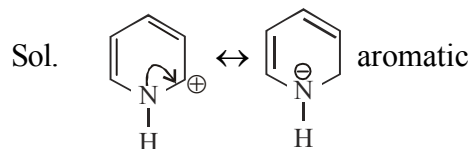
Sol. (c) has (+M) equal (+M) effect of OCH_3 as (b) but user (-I) effect due to greater distance. Mesomeric effect is distance indendent while inductive effect is distance dependent. Thus (c) has maximum electron density and is most basic.

55. (d)



Because of resonance single bond converts to double bond and vice versa. Hence the order of bond length is $b > a > c$

56. (c)



57. (c)

Sol. Greater the +M greater the stability

58. (c)

Sol. Stability of carbanion $\propto \frac{1}{\text{EDG}} \propto \text{EWG}$

59. (c)

Sol. The bond which has highest double bond character will be strongest and double bond character decreases with increase in hyperconjugation.

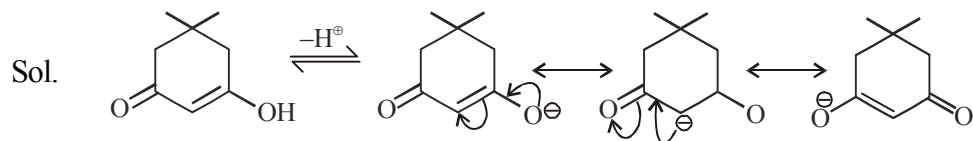
60. (c)

Sol. Greater the +M effect greater the electron density in the ring.
Order of +M effect : $-\text{NH}_2 > -\text{OH} > -\text{CH}_3 > \text{NO}_2$

61. (c)

Sol. Greater the availability of electrons greater will be the basicity.

62. (c)



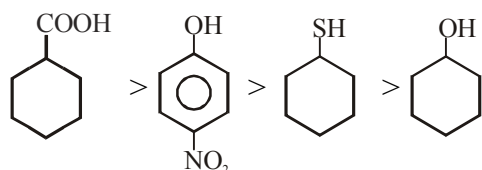
[–ve charge is delocalised on both oxygen and thus charge is more stable]

63. (d)

Sol. Greater the resonance greater will be the stability of negative charge.

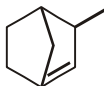
64. (b)

Sol. The order of acidic strength of the following:



65. (c)
Sol. (c) is most stable due to -ve charge on more electronegative O atom.

66. (c)

Sol.  is least stable because double bond at bridge head is unstable. (Bredt's rule)

67. (c)

Sol. Greater the number of carbon atoms in a molecule, greater will be the heat of combustion.

68. (c)

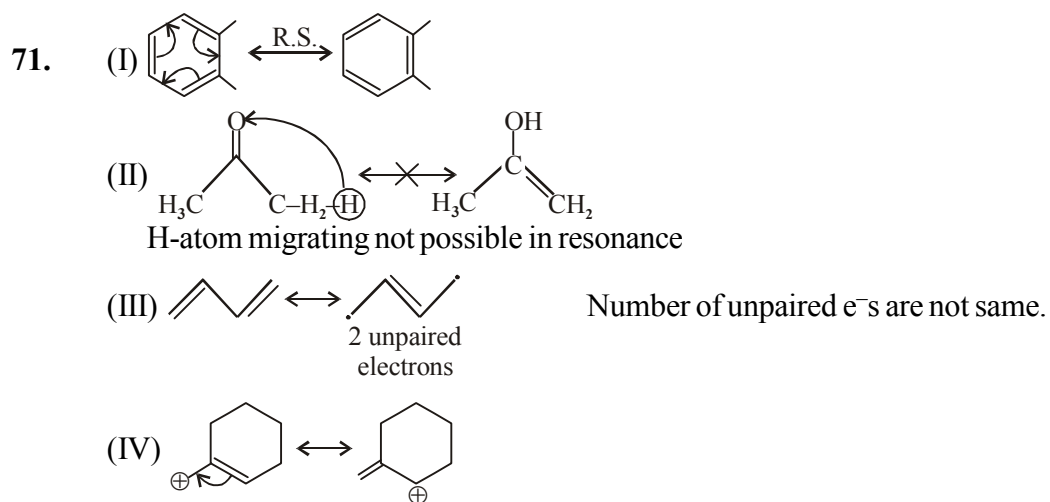
Sol. $\text{HOH} \propto \frac{1}{\text{Stability of alkene}}$ (where no. of π -bonds are same)

69. (a)

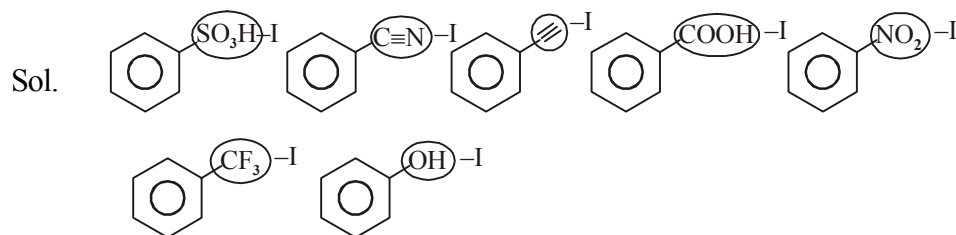
Sol. Greater the conjugation, greater will be the stability.

70. (c)

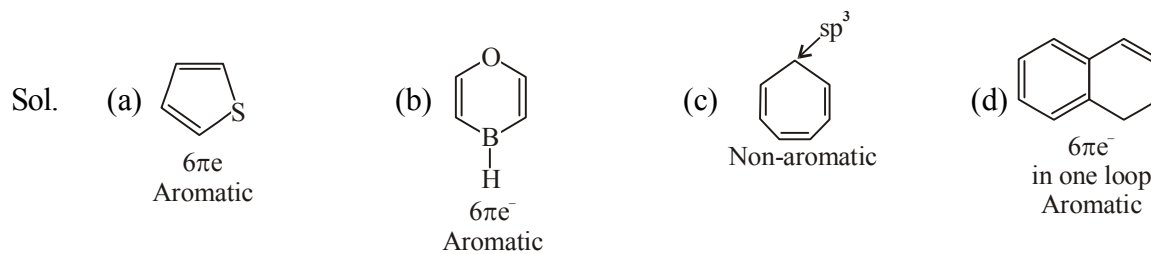
Sol. Heat of combustion $\propto \frac{1}{\text{Stability}}$



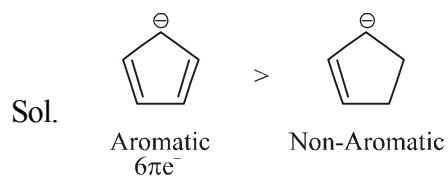
72. (c)



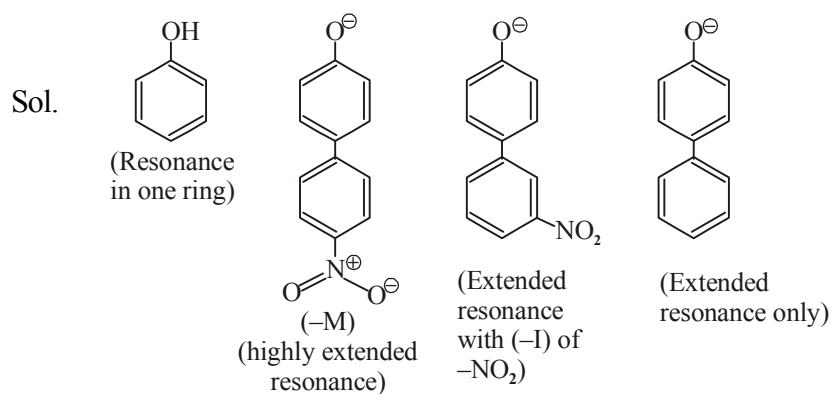
73. (c)



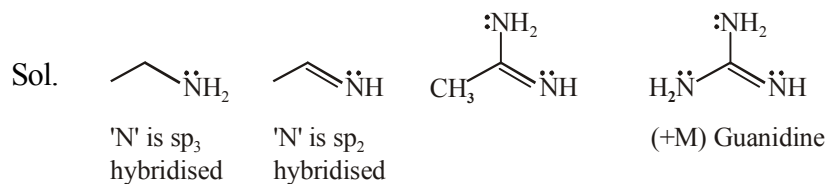
74. (c)



75. (b)



76. (c)



77. (a)

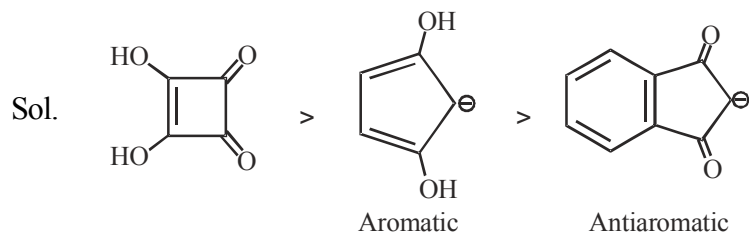
Sol. All atoms are sp^2 hybridisation, so coplanar.

78. (b)

79. (c)

Sol. (c) is most stable due to negative charge on more electronegative O atom.

80. (c)

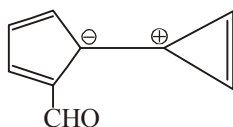


81. (d)

Sol. The octet of every element is complete & the positive charge is on nitrogen is more stable than oxygen.

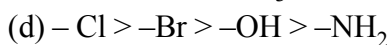
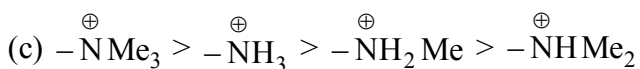
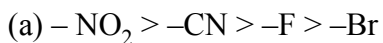
82. (a)

Sol. The electron withdrawing CHO group would further increase the polarisation of H bond by stabilising the \ominus charge, then increasing the single bond character and decreasing the rotational barrier.

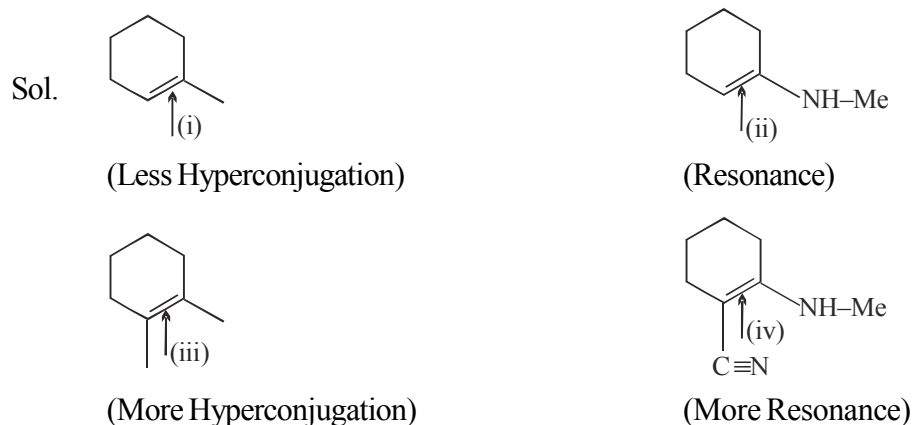


83. (b)

Sol. Correct orders are as follows :



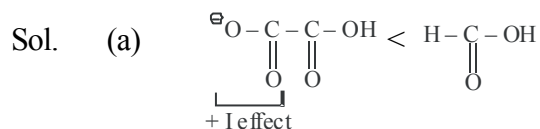
84. (c)



85. (d)

86. (b)

87. (c)



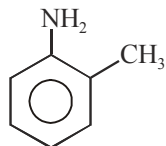
(b) I more acidic due to -I of F.

(c) III (resonance stabilised) > I (Lesser -I) > II (More I).

(d) Order is a combined effect of +I effect of ethyl group and hydration of conjugate acid.

28. (c)

Sol. In a period, lesser the electronegativity, greater the basic strength.



is least basic because of SIP. The para isomer is more basic than meta due to +H effect

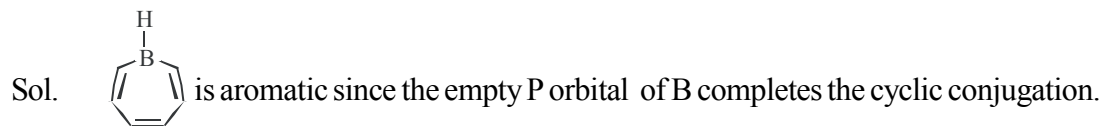
of CH_3 in para isomer.

89. (c)

Sol. Lesser the stability of alkene, greater will be, the heat of hydrogenation.

(c) is least stable as only two π bonds are in conjugation.

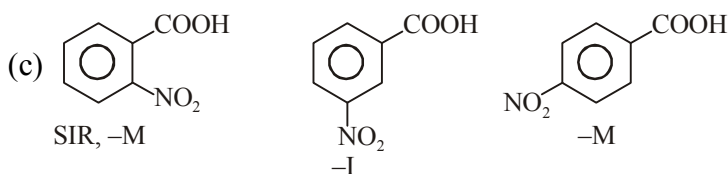
90. (d)



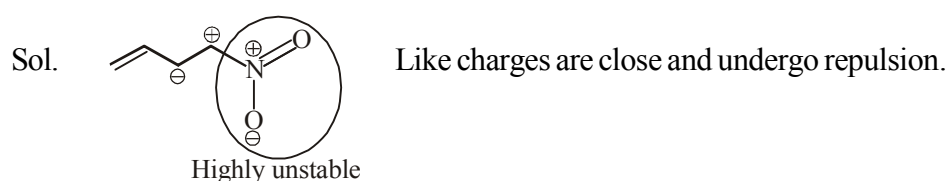
91. (d)

Sol. (a) Stronger (-M) of NO_2 than (-I) of F makes p-nitro phenol more acidic.

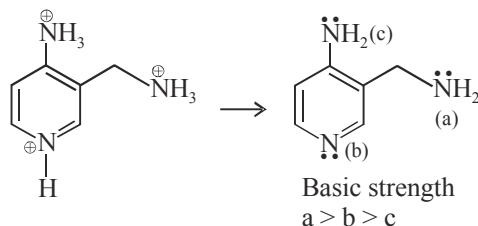
(b) $-\text{NF}_3^{\oplus}$ is stronger -I group due to (-I) of F.



92. (a)



93. (b)
Sol. Acidic strength order is opposite of basic strength order



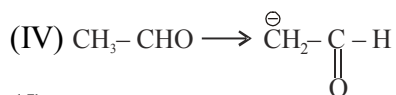
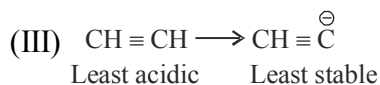
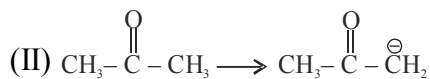
94. (a)
Sol. (1) and (2) are highly basic due to (+M) effect of NH_2 (1) > (2) due to (+M) of OCH_3 as opposed to (-M) of CN .
(3) > (4) since in (4) the lone pair of N undergoes resonance with two $\text{C}=\text{O}$ groups and is thus less available for donation.

95. (b)
Sol. The two most acidic H atoms will be abstracted.

96. (c)
Sol. (c) is Guanidine, one of the strongest organic base. It is highly basic due to 3 equivalent RS in its conjugate acid.
(b) is less basic than c due to lesser +M of the top NH group.

97. (c)
Sol. Sulphonic acid is more acidic than carboxylic acid (c) is more acidic than (a) due to electron withdrawing effect of the $-\text{COOH}$ group.

98. (b)
Sol. (I) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \longrightarrow \text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\overset{\ominus}{\text{C}}\text{H}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$
Most acidic Most stable



99. (d)
Sol. (III) is most basic as the lone pair of N is localised IV > II > I as per extent of involvement of lone pair of N in resonance. More resonance decreases basic strength due to decreased availability of lone pair for line is donation.

100. (b)
Sol.
Aromatic