Hydrogen Bond

1. Which among the following has the lowest boiling point?

1) H_2O 2) H_2S 3) H_2Se 4) H_2Te

2. The hydrogen bond is strongest in

1) F-H.....F 2) F-H.....O 3) O-H.....F 4) N-H.....F

3. Which among the following has the highest boiling point?

1) HF 2) HCl 3) HBr 4) HI

4. From the following statements.

i) O.....H bond length is more than O-H bond length

ii) The order of dipole moment $NH_3 > NF_3 > BF_3$

iii) Hydrogen ion contains only covalent bond.

The correct combination is

1) All are correct 2) Only i and iii are correct

3) Only i and ii are correct 4) All are wrong

5. Intramolecular hydrogen bonding is present in

1) Salicylaldehyde 2) Orthonitrophenol 3) Paranitrophenol 4) Both 1 and 2

6. Which of the following hydrogen bond is relatively weaker?

1) N.....H-N 2) F.....H-F 3) N-H.....O 4) O.....H-O

7. Inter molecular hydrogen bonding is present in

1) H_2O 2) NH_3 3) C_2H_5OH 4) All

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8. Inter molecular hydrogen bond is not present

1) Alcohol 2) Ethers 3) Ammonia 4) H_2O

9. The solubility of alcohol in water is due to

1) Covalent bond 2) Ionic bond

3) Hydrogen bond with water 4) Vanderwaal's bond

10. Inter molecular hydrogen bond is observed in

1) Orthonitrophenol 2) Salicylaldehyde

3) Parahydroxybenzaldehyde 4) Salicylic acid

11. Hydrogen bond is formed by

1) Fluorine 2) Oxygen 3) Nitrogen 4) All the above

12. Identify the correct statements among the following

i) The bond energy of hydrogen bond is 4-18 KJ/mole

ii) Boiling point of HF is less than that of water

iii) O.....H hydrogen bond length is greater than O-H covalent bond length

iv) Chloride in HCl can exhibit hydrogen bonding but not nitrogen in NH_3

1) i and iv only 2) ii and iii only 3) i, ii, iii only 4) All are correct

13. O-H bond length in water is $0.97A^0$. The hydrogen bond length in the water can be

1) $0.87A^0$ 2) $0.97A^0$ 3) $0.77A^0$ 4) $1.76A^0$

14. Two strands of DNA are held together by

1) Ionic bond 2) Covalent bond

3) Hydrogen bonding 4) Dative bonding

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15. O-nitrophenol is more volatile than P-nitrophenol. It is due to

1) Inter molecular hydrogen bonding in O-nitrophenol and intra molecular hydrogen bonding in P-nitrophenol.

2) Intra molecular hydrogen bonding in O-nitrophenol and inter molecular hydrogen bonding in P-nitrophenol.

3) More stronger intramolecular hydrogen bonding in O-nitrophenol as compared to P-nitrophenol.

4) More stronger inter molecular hydrogen bonding in O-nitrophenol as compared to P-nitrophenol.

16. The maximum number of hydrogen bonds that can be formed by water molecules is

1) 1 2)2 3) 3 4) 4

17. Hydrogen bond energy is about

1. 10 K.Cal 2. 10 Joules 3. 10 ergs 4. 10 e.v.

18. The force responsible for the union of two ice blocks as a single block is

1. Vanderwaals force 2. Hydrogen bonds

3. Dipole interaction 4. Vanderwaals repulsion

19. If the boiling point of ethanol (molecular weight -46) is 78^0C , what is the boiling point of diethyl ether (molecular weight=74)?

1. 100^0C 2. 78^0C 3. 86 C 4. 34'C

20. The compound with highest boiling point among the following

1) CH_3Cl 2) HCl 3) CH_4 4) CH_3OH

21. Acetic acid exists as dimer in benzene due to

1) Condensation reaction 2) Hydrogen bonding

3) Presence of carboxyl group 4) Presence of hydrogen atom at a-carbon

22. Between any two of the following molecules, hydrogen bonding is not possible

1) Two primary amine molecules 2) Two secondary amine molecules

3) Two tertiary amine molecules 4) Two ammonia molecule

23. Identify the correct statement (s)

I) The formation of a cation from a neutral atom is favoured by small size of the atom.

II) The formation of a chemical bond is associated with an increase in potential energy.

III) The O.....H hydrogen bond length is more than O-H bond length.

IV) Pi bond does not exist between two atoms without a sigma bond.

1) ii and iii only 2) iii and iv only 3) iii only 4) ii and iv only

24. The correct decreasing order of boiling points

1) $H_2O > HF > NH_3 > CH_4$ 2) $HF > H_2O > NH_3 > CH_4$

3) $H_2O > NH_3 > HF > CH_4$ 4) $HF > H_2O > CH_4 > NH_3$

25. A: Acetic acid has high boiling point than propanol

R: Acetic acid has stronger hydrogen bonds than alcohol with similar molecular weights

1) Both A and R are true, and R is correct explanation of A.

2) Both A and R are true, and R is not correct explanation of A.

3) A is true, but R is false.

4) A is false, but R is true.

26. A: Parahydroxybenzaldehyde is more soluble in water than orthohydroxy benzaldehyde.

R: Parahydroxy and orthohydroxy benzaldehyde both contain inter molecular hydrogen bonds.

1) Both A and R are true, and R is correct explanation of A.

2) Both A and R are true, and R is not correct explanation of A.

3) A is true, but R is false.

4) A is false, but R is true.

27. Hydrogen fluoride in vapour state exist as

1) HF 2) $(HF)_n$ 3) $(HF)_6$ 4) $(HF)_2$

28. Which can be purified by steam distillation?

1) o-hydroxybenzaldehyde 2) m-hydroxybenzaldehyde

3) p-hydroxybenzaldehyde 4) All

29. Chelation is not present in

1) Salicylic acid 2) O-hydroxybenzaldehyde

3) O-nitrophenol 4) O-chloroaniline

30. The boiling point of H_2O is more than HF, because

1) Hydrogen bonds are stronger in H_2O than in HF

2) The molecular weight of H_2O is more than HF

3) Number of hydrogen bonds in HF is more than in H_2O

4) H_2O has no hydrogen bonds in vapour state but HF contains hydrogen bonds in vapour state

31. Which one of the following is more hydrogen bonded than the other?

1) H_2O 2) H_2O_2 3) HF 4) Orthonitrophenol

32. The maximum extent of hydrogen bonding is shown by

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1) H_2O 2) H_2Se 3) H_2S 4) HF

33. Hydrogen bonding is strongest in

1) RCOOH 2) RCH_2OH 3) RCH_2NHCH_3 4) $RCONHCH_3$

34. Which of the following has hydrogen bonding even in vapour state?

1) H_2O 2) NH_3 3) HF 4) CH_4

35. The following can be purified by steam distillation

1) Ethyl alcohol 2) Ortho nitro phenol 3) Acetic acid 4) Ammonia

36. The compound x has ionic, covalent and hydrogen bonds. Then x is

1) NH_4^+ 2) H_2CO_3 3) KHF_2 4) $H_3N\ BF_3$

37. A: The boiling point of acetic acid is higher than ethyl alcohol.

R: Acetic acid has stronger hydrogen bond between its molecules.

1) Both A and R are true, and R is correct explanation of A.

2) Both A and R are true, and R is not correct explanation of A.

3) A is true, but R is false.

4) A is false, but R is true.

38. Which of the following exhibits lowest boiling point?

1) CH_4 2) H_2O 3) HF 4) C_2H_5OH

39. Which one among the following does not have the hydrogen bond?

1) Phenol 2) Liquid NH_3 3) Water 4) Liquid HCl

40. A: NH_3 gas cannot be collected over water.

R: NH_3 dissolves in water and forms hydrogen bonds.

1) Both A and R are true, and R is correct explanation of A.

2) Both A and R are true, and R is not correct explanation of A.

3) A is true, but R is false.

4) A is false, but R is true.

KEY

1) 2	**2)1**	**3) 1**	**4) 3**	**5)4**	**6) 1**	**7) 4**	**8) 2**	**9) 3**	**10) 3**
11) 4	**12) 2**	**13) 4**	**14)3**	**15)2**	**16) 4**	**17) 1**	**18) 2**	**19) 4**	**20) 4**
21) 2	**22) 3**	**23) 2**	**24) 1**	**25) 1**	**26) 3**	**27) 3**	**28)1**	**29)4**	**30) 4**
31) 2	**32) 1**	**33) 1**	**34)3**	**35)2**	**36)3**	**37) 1**	**38)1**	**39) 4**	**40) 1**

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