Multiple Choice Questions

Kossel and Lewis approach (Electronic theory of valency), Ionic and covalent bonds, Lattice enthalpy Lewis structure

[MHT-CET 2005]

1. How many electron pairs are present in valence shell of oxygen in water molecule ?
   a) 4 b) 1 c) 2 d) 3

[MHT-CET 2019]

2. The extent of polarisation in an ionic bond is greater when
   a) Cation is smaller and anion is larger in size.
   b) Cation is larger and anion is smaller in size.
   c) Density of positive charge on cation is less.
   d) Density of negative charge on anion is less.
3. Which of the following molecules contains 8 electrons in the outermost orbit of central atom ?
   a) SF_6 b) $BeCl_2$ c) CH_4 d) PCl_5
4. Which bond in a molecule of ethyl magnesium bromide is ionic in nature ?
   a) C – C bond b) C – Mg bond c) Mg – Br bond d) C – H bond

[MHT-CET 2020]

5. Which of the following is an ionic compound ?
   a) $CHCl_3$ b) SO_2 c) ICl d) KI
6. Which of the following molecules has a central atom with complete octet ?
   a) Sulphur Hexafluoride b) Boron Trifluoride
   c) Aluminium chloride d) Methane
7. When an ionic bond is formed, ions of which of the following pairs of atoms will contain same number of electrons in their shell ?
   a) K and Cl b) Na and Br c) K and Br d) Na and Cl
8. How many lone pairs of electrons are present on chlorine atom in chloric acid ?
   a) 4 b) 1 c) 3 d) 2
9. Sulphur atom in H_2SO_4 is surrounded by
   a) 8 electrons b) 10 electrons c) 16 electrons d) 12 electrons
10. Which of the following molecules does not obey octet rule ?
    a) O_2 b) N_2 c) H_2O d) $AlCl_3$
11. Total number of lone pairs of electrons on oxygen atoms in carbon dioxide are
    a) 4 b) 1 c) 3 d) 2
12. Which among the following is an example of odd electron molecules ?
    a) PCl_5 b) NO_2 c) LiCl d) BF_3
13. Which among the following is electron deficient compound ?
    a) SiF_4 b) CCl_4 c) BCl_3 d) PCl_5

14. Which among the following is NOT odd electron molecule ?
a) NO_2 b) CO c) ClO_2 d) NO

15. How many electrons are present around sulphur atom in H_2SO_4 ?
a) 6 b) 4 c) 2 d) 12

16. Which among the following is an odd electron molecule ?
a) CO b) SO_2 c) NO d) CO_2

Formal charges, Valence bond theory (VBT), Dipole moment

[MHT-CET 2019]

17. In ozone molecule, the formal charge on the central oxygen atom is
a) 0 b) +2 c) +1 d) −1

[MHT-CET 2020]

18. What is formal charge on hydrogen atom in water molecule ?
a) 0 b) $\frac{-1}{2}$ c) 1 d) $\frac{+1}{2}$

19. Which of the following molecules has zero dipole moment ?
a) H_2O b) H_2S c) NF_3 d) CO_2

20. Which of the following molecules has non-zero dipole moment ?
a) CO_2 b) NF_3 d) BF_3 d) CH_4

21. What is the value of dipole moment for HCl molecule ?
a) 3.33 D b) 1.85 D c) 1.91 D d) 1.03 D

[MHT-CET 2021]

22. What is the formal charge on sulphur atom in H_2SO_4 ?
a) zero b) + 4 c) + 6 d) − 6

23. What is the formal charge on carbon atom in CO_3^{2-} ion ?
a) − 2 b) − 4 c) + 4 d) zero

24. What is the formal charge of oxygen atom in carbon monoxide ?
a) + 2 b) + 1 c) − 1 d) zero

25. Identify the molecule having dipole moment.
a) BF_3 b) CCl_4 c) $CHCl_3$ d) CH_4

26. What is the formal charge on 'N' atom in NH_4^+ ion ?
a) + 1 b) − 3 c) − 1 d) zero

27. What is the formal charge on 'C' atom in $:S \equiv C - \ddot{N}:$?
a) − 1 b) − 2 c) + 1 d) zero

28. What is the formal charge on 'N' atom in $\left[\ddot{S}-C\equiv N:\right]^-$ ion ?

a) zero b) + 3 c) − 2 d) + 2

29. What is the formal charge on 'S' atom in $\left[\ddot{S}=C=\ddot{N}:\right]^-$ ion ?

a) zero b) + 4 c) + 2 d) − 4

30. What is the formal charge on nitrogen atom in NO_3^- ion ?

a) + 5 b) + 1 c) + 2 d) zero

[MHT-CET 2022]

31. Which among the following statements is NOT correct about dipole moment of NH_3 and NF_3 ?

a) In NH_3, orbital dipole is in the same direction as that of resultant dipole moment of N – H bonds.

b) In NF_3, orbital dipole is in the opposite direction of the resultant dipole moment of three N – F bonds.

c) Fluorine is less electronegative than nitrogen.

d) The dipole moment of NH_3 is more than that of NF_3

32. Dipole moment of water is more than ammonia because

a) Nitrogen has only one lone pair while oxygen has two lone pairs of electrons.

b) Nitrogen has two lone pairs while oxygen has only one lone pair of electrons.

c) Nitrogen is more electronegative than oxygen

d) Atomicity of water is three while that of ammonia is four.

33. What is the unit of dipole moment ?

a) dynes b) debye c) Newton d) Poise

34. Which among the following molecules has non-zero dipole moment ?

a) $CHCl_3$ b) BF_3 c) CO_2 d) CH_4

35. Which of the following molecules has zero dipole moment ?

a) HBr b) NF_3 c) CCl_4 d) H_2S

Overlapping of orbitals, VSEPR Theory, Hybridization

[MHT-CET 2007]

36. Structure of ammonia is

a) Pyramidal b) Tetrahedral c) Trigonal d) Trigonal pyramidal

37. What is the geometry of water molecule ?
a) distorted tetrahedral b) distorted octahedral
c) trigonal planar d) square planar

38. What is the structure of PCl_5 ?
a) Pyramidal b) Square planar
c) Trigonal bipyramidal d) Octahedral

[MHT-CET 2020]

39. The H – N – H bond angle in NH_3 molecule is
a) 109° 28′ b) 107° 18′ c) 101° d) 90°

40. Which type of overlap is involved in formation O – H bonds in water molecule ?
a) $SP^2 - S$ b) $SP^2 - P$ c) $SP^3 - S$ d) $SP - S$

41. What type of hybridization results in tetrahedral geometry ?
a) SP^2 b) dSP^2 c) SP^3 d) SP

42. If one 'S', three 'P' and one 'd' atomic orbital take part in hybridization, then the number of hybrid orbitals formed are
a) 3 b) 2 c) 5 d) 4

43. What type of hybridization is present in PCl_5 molecule ?
a) SP^3d hybridization b) SP^2 hybridization
c) SP^3 hybridization d) SP^3d^2 hybridization

44. Which of the following is true for the compound AB, if it is formed by transfer of electron from A to B ?
a) AB forms electrovalent bond b) AB forms covalent bond
c) B is divalent d) A is divalent

45. Which of the following molecules contains 50% P character of hybrid orbital of C atom?
a) Propane b) Methane c) Acetylene d) Ethane

46. Which of the following is correct decreasing order of the repulsive interaction of electron pairs in a molecule ?
a) Bond pair – bond pair = bond pair – lone pair > lone pair – lone pair
b) Lone pair – bond pair > lone pair – lone pair > bond pair – bond pair
c) Lone pair – lone pair > lone pair – bond pair > bond pair – bond pair
d) Bond pair – bond pair > lone pair – bond pair > lone pair – lone pair.

47. Identify the molecule with linear geometry :
a) BeF_2 b) C_2H_4 c) SO_2 d) ClF_4

48. Which of the following molecules contains 25% of S – character of carbon atom in hybrid state ?
a) Methane b) Acetylene c) Ethylene d) Benzene