MISCELLANEOUS EXERCISE

Choose the correct options for each of the following questions. Questions marked with * may have more than one correct options.

1. The correct order of the size of the iodine species is :
(A) $I < I^+ < I^-$ **(B)** $I < I^- < I^+$
(C) $I^+ < I^- < I$ **(D)** $I^+ < I < I^-$

2. The law of triads is applicable to :
(A) Hydrogen, Oxygen, Nitrogen
(B) Chlorine, Bromine, Iodine
(C) Sodium, Neon, Calcium
(D) None

3. Which of the following gains electrons more easily ?
(A) X^- (Cl^-, Br^-, I^-) **(B)** OH^-
(C) H^- **(D)** None

4. Highest covalent character is found in which of the following ?
(A) CaF_2 **(B)** $CaCl_2$
(C) CaI_2 **(D)** $CaBr_2$

5. Which of the following anions is most easily polarized ?
(A) Cl^- **(B)** Se^{2-} **(C)** Br^- **(D)** Te^{2-}

***6.** The non-metallic cation is in
(A) CrO_2Cl_2 **(B)** VOCl
(C) OF_2 **(D)** PCl_3

***7.** Which of the following is(are) correct ?
(A) Double bond is shorter than a single bond
(B) σ-bond is weaker than a π-bond
(C) Double bond is stronger than a single bond
(D) Covalent bond is stronger than a hydrogen bond

8. The geometrical configuration (structure) of BF_3 and NF_3 molecules is :
(A) The same because of same covalency of the central atom
(B) Different because BF_3 is polar and NF_3 is non-polar
(C) Different because BF_3 is non-polar and NF_3 is polar
(D) None of these

9. When the number of electron pairs on the central atom is six, then geometry of the molecule is :
(A) Octahedral **(B)** Trigonal bipyramidal
(C) Equilateral triangle **(D)** Linear

10. Select correct statement about valence-bond approach :
(A) Each bond is formed by maximum overlap for its maximum stability
(B) It represents localised electron model of bonding
(C) Most of the electrons retain the same orbital locations as in a separated atoms
(D) All are correct atoms

11. In vinyl acetylene $\overset{1}{C}H \equiv \overset{2}{C} - \overset{3}{C}H = \overset{4}{C}H_2$, type of overlapping in $(C \ \sigma \ C)$ bond is :
(A) $sp^2 - sp$ **(B)** $sp - sp^2$
(C) $sp^3 - sp^3$ **(D)** $sp^3 - sp^2$

12. The compound $(CH_3 - \overset{OH}{\overset{|}{C}} = CH_2)$ contains
(A) 10 σ-bonds, 1π-bond and 1 lone pair
(B) 8 σ-bonds, 2π-bonds and 2 lone pairs
(C) 9 σ bonds, 1π bond and 2 lone pairs
(D) 9 σ bonds, 2π bonds and 1 lone pair

***13.** Select correct statement about NH_3 and BF_3.
(A) BF_3 and NH_3 have same dipole moment
(B) Dipole moment of NH_3 is higher than that of BF_3
(C) BF_3 molecule has a planar structure, while the NH_3 molecule is pyramidal
(D) The nitrogen atom has unshared pair of electrons, while the boron atom has a free (vacant) valence orbital

14. Which of the following ions has the maximum polarising power ?
(A) Na^+ **(B)** Ca^{2+}
(C) Mg^{2+} **(D)** Al^{3+}

*15. Which property is due to H-bonding ?
(A) High b.p. of water
(B) High viscosity of sulphuric acid
(C) Solubility of ammonia in water
(D) Polar nature of halogen acid

16. Number of water molecules directly attached to one water molecule is (due to H-bonding) :
(A) 1 (B) 2 (C) 3 (D) 4

17. Which of the following has the highest percentage of ionic character in its bonding ?
(A) LiI (B) $MgCl_2$ (C) CsF (D) CsI

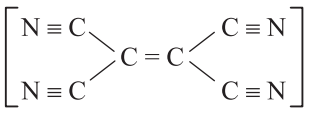
18. Which of the following is most polar bond ?
(A) Cl—Cl (B) N—F (C) C—F (D) O—F

19. The strength of bonds by overlapping of atomic orbitals is in order :
(A) s – s > s – p > p – p (B) s – s < p – p < s – p
(C) s – p < s – s < p – p (D) p – p < s – s < s – p

20. Which of the following molecules has the shortest carbon-to-carbon bond ?
(A) C_2H_4 (B) C_2H_6 (C) C_2H_2 (D) C_2Cl_6

21. In terms of polar character, which one of the following order is correct ?
(A) $NH_3 < H_2O < HF < H_2S$
(B) $H_2S < NH_3 < H_2O < HF$
(C) $H_2O < NH_3 < H_2S < HF$
(D) $HF < H_2O < NH_3 < H_2S$

22. How many σ and π-bonds are there in the molecule of tetracyano-ethylene ?
(A) 4σ, 14π
(B) 5σ, 13π
(C) 8σ, 10π
(D) 9σ, 9π



23. The BCl_3 is a planar molecule whereas NCl_3 is pyramidal because :
(A) BCl bond is more polar than N—Cl bond
(B) N—Cl bonds is more covalent that B—Cl bond
(C) Nitrogen atom is smaller than boron atom
(D) BCl_3 has no lone pair electrons but NCl_3 has a lone pair of electrons

24. Which one of the following has the highest dipole moment ?
(A) AsH_3 (B) SbH_3
(C) PH_3 (D) NH_3

25. Which one of the following molecules will form a linear polymeric structure due to hydrogen bonding ?
(A) NH_3 (B) H_2O (C) HCl (D) HF

26. H_2O is dipolar, whereas BeF_2 is not. It is because :
(A) The electronegativity of F is greater than that of O
(B) H_2O involves hydrogen bonding whereas BeF_2 is a discrete molecule
(C) H_2O is linear and BeF_2 is angular
(D) H_2O is angular and BeF_2 is linear

27. The molecule having highest bond energy is :
(A) N—N (B) F—F (C) C—C (D) O—O

28. In 1, 3-butadiene ($H_2C=CH–CH=CH_2$), the carbon atom is hybridised as :
(A) sp (B) sp^2 (C) sp^3 (D) sp^2 and sp^3

29. Hybridization of 1 and 2 carbon atom in $\overset{1}{C}H_2 = \overset{2}{C} = CH_2$ are :
(A) sp, sp (B) sp^2, sp^2
(C) sp^2, sp (D) sp^3, sp^2

30. The correct order of dipole moments of HF, H_2S and H_2O is :
(A) $HF < H_2S < H_2O$ (B) $HF < H_2S > H_2O$
(C) $HF > H_2S > H_2O$ (D) $HF > H_2O > H_2S$

*31. The molecule having minimum dipole moment among the following is :
(A) CHI_3 (B) CH_4
(C) $CHCl_3$ (D) CCl_4

32. The interatomic distance in H_2 and Cl_2 molecules are 74 and 198 pm respectively. The bond length of HCl is :
(A) 272 pm (B) 136 pm
(C) 124 pm (D) 248 pm

*33. The type of bonding(s) present inNH_4Cl is(are) :
(A) ionic (B) covalent
(C) coordinate (D) singlet

*34. Which of the following statement(s) is(are) true ?
(A) HF is more polar than HBr
(B) CuCl is more covalent than NaCl
(C) HF is less polar than HBr
(D) Chemical bond formation takes place when forces of attraction overcome the forces of repulsion

35. A diatomic molecule has a dipole moment of 1.2 D. If its bond distance is 1.0Å, what fraction of an electric charge exist on each atom ?

(A) 0.25 **(B)** 0.5
(C) 0.025 **(D)** 0.05

36. According to Fajan rules, the covalent character is most favored in :

(A) Small cation large anion
(B) Small cation, small anion
(C) Large cation, large anion
(D) Large cation, small anion

37. The hybrid states of carbon in diamond, graphite and acetylene are respectively :

(A) sp^2, sp, sp^3 **(B)** sp, sp^2, sp^3
(C) sp^3, sp^2, sp **(D)** sp^2, sp^3, sp

38. In which of the following molecule, all the atoms lie in one plane ?

(A) CH_4 **(B)** BF_3 **(C)** PF_5 **(D)** NH_3

39. Which pair of elements among the following will form most stable ionic bond :

(A) Na and Cl **(B)** Mg and F
(C) Li and F **(D)** Na and F

***40.** The stability of ions of Ge, Sn and Pb will be in the order :

(A) $Ge^{2+} < Sn^{2+} < Pb^{2+}$ **(B)** $Ge^{4+} < Sn^{4+} < Pb^{4+}$
(C) $Sn^{4+} > Pb^{2+}$ **(D)** $Pb^{2+} > Pb^{4+}$

41. In OF_2 , number of bond pairs and lone pairs of electrons are respectively :

(A) 2, 6 **(B)** 2, 8
(C) 2, 10 **(D)** 2, 9

42. The correct order of polarizability for I^-, Br^-, Cl^-, F^- is :

(A) $I^- > Br^- > Cl^- > F^-$ **(B)** $I^- > Br^- = Cl^- > F^-$
(C) $I^- < Br^- < Cl^- < F^-$ **(D)** $I^- = Br^- < Cl^- = F^-$

ANSWERS TO MISCELLANEOUS EXERCISE

1. D	**2.** B	**3.** D	**4.** C	**5.** D	**6.** CD	**7.** ACD
8. D	**9.** A	**10.** D	**11.** B	**12.** C	**13.** BCD	**14.** D
15. ABC	**16.** D	**17.** C	**18.** C	**19.** A	**20.** C	**21.** B
22. D	**23.** D	**24.** D	**25.** D	**26.** D	**27.** C	**28.** B
29. C	**30.** D	**31.** BD	**32.** B	**33.** ABC	**34.** ABD	**35.** A
36. A	**37.** C	**38.** B	**39.** D	**40.** AD	**41.** B	**42.** A