

## Assignment No – 1

### Chemical Bonding and Molecular Structure

**Que 1. Lattice energy of an ionic compound depends upon**

- (a) Charge on the ion only
- (b) Size of the ion only
- (c) Packing of ions only
- (d) Charge on the ion and size of the ion

**Que 2. In the given bonds which one is most ionic**

- (a) Cs –Cl
- (b) Al –Cl
- (c) C –Cl
- (d) H –Cl

**Que 3. Element x is strongly electropositive and y is strongly electronegative. Both element are univalent, the compounds formed from their combination will be**

- (a)  $x^+ y^-$
- (b)  $x^- y^+$
- (c)  $x - y$
- (d)  $x \rightarrow y$

**Que 4. In the formation of NaCl from Na and Cl**

- (a) Sodium and chlorine both give electrons
- (b) Sodium and chlorine both accept electrons
- (c) Sodium loses electron and chlorine accepts electron
- (d) Sodium accepts electron and chlorine loses electron

**Que 5. Which of the following is an electrovalent linkage**

- (a)  $CH_4$
- (b)  $MgCl_2$
- (c)  $SiCl_4$
- (d)  $BF_3$

**Que 6. Electrovalent compounds do not have**

- (a) High M.P. and Low B.P.
- (b) High dielectric constant
- (c) High M.P. and High B.P.
- (d) High polarity

**Que 7. Many ionic crystals dissolve in water because**

- (a) Water is an amphoteric solvent
- (b) Water is a high boiling liquid

- (c) The process is accompanied by a positive heat of solution
- (d) Water decreases the interionic attraction in the crystal lattice due to solvation

**Que 8. The electronic structure of four elements A, B, C, D are**

- (A)  $1s^2$  (B)  $1s^2, 2s^2 2p^2$
- (C)  $1s^2, 2s^2 2p^5$  (D)  $1s^2, 2s^2 2p^6$

The tendency to form electrovalent bond is largest in

- (a) A (b) B (c) C (d) D

**Que 9. With which of the given pairs  $CO_2$  resembles**

- (a)  $HgCl_2, C_2H_2$  (b)  $HgCl_2, SnCl_4$
- (c)  $C_2H_2, NO_2$  (d)  $N_2O$  and  $NO_2$

**Que 10. The electron pair which forms a bond between two similar non-metallic atoms will be**

- (a) Dissimilar shared between the two
- (b) By complete transfer from one atom to other
- (c) In a similar spin condition
- (d) Equally shared in between the two

**Que 11. For the formation of covalent bond, the difference in the value of electronegativities should be**

- (a) Equal to or less than 1.7 (b) More than 1.7
- (c) 1.7 or more (d) None of these

**Que 12. Which type of bond is formed between similar atoms**

- (a) Ionic (b) Covalent
- (c) Coordinate (d) Metallic

**Que 13. Covalent compounds are generally ..... in water**

- (a) Soluble (b) Insoluble
- (c) Dissociated (d) Hydrolysed

**Que 14. Which one is the electron deficient compound**

- (a)  $ICl$  (b)  $NH_3$

(c)  $\text{BCl}_3$

(d)  $\text{PCl}_3$

**Que 15. Which among the following elements has the tendency to form covalent compounds**

(a) Ba

(b) Be

(c) Mg

(d) Ca

**Que 16. Silicon has 4 electrons in the outermost orbit. In forming the bonds**

(a) It gains electrons

(b) It loses electrons

(c) It shares electrons

(d) None of these

**Que 17. According to VSEPR theory the geometry of a covalent molecules depends upon**

(a) the number of bond pairs of electrons

(b) the number of lone pairs of electrons

(c) the number of electron pairs present in the outer shell of the central atom

(d) All the above

**Que 18. The geometry of  $\text{ClO}^-$  ion according to Valence Shell Electron Pair Repulsion (VSEPR) theory will be**

(a) planar triangular

(b) pyramidal

(c) tetrahedral

(d) square planar

**Que 19. In  $\text{BrF}_3$  molecule, the lone pairs occupy equatorial positions to minimize**

(a) lone pair - bond pair repulsion only

(b) bond pair - bond pair repulsion only

(c) lone pair - lone pair repulsion and lone pair - bond pair repulsion

(d) lone pair - lone pair repulsion only

**Que 20. Which of the correct increasing order of lone pair of electrons on the central atom?**

(a)  $\text{IF}_7 < \text{IF}_5 < \text{ClF}_3 < \text{XeF}_2$

(b)  $\text{IF}_7 < \text{XeF}_2 < \text{ClF}_2 < \text{IF}_5$

(c)  $\text{IF}_7 < \text{ClF}_3 < \text{XeF}_2 < \text{IF}_5$

(d)  $\text{IF}_7 < \text{XeF}_2 < \text{IF}_5 < \text{ClF}_3$

**Que 21. The number of lone pair and bond pair of electrons on the sulphur atom in sulphur dioxide molecule are respectively**

- (a) 1 and 3 (b) 4 and 1  
(c) 3 and 1 (d) 1 and 4

**Que 22. A molecule has two lone pairs and two bond pairs around the central atom. The molecule shape is expected to be**

- (a) V-shaped (b) triangular  
(c) linear (d) tetrahedral

**Que 23. Using VSEPR theory, predict the species which has square pyramidal shape**

- (a)  $\text{SnCl}_2$  (b)  $\text{CCl}_4$   
(c)  $\text{SO}_3$  (d)  $\text{BrF}_5$

**Que 24. The ground state electronic configuration of valence shell electrons in nitrogen molecule ( $\text{N}_2$ ) is written as  $\text{KK } \sigma 2s, \sigma^* 2s, \pi 2p_x, \pi 2p_y, \sigma 2p_z$ . Bond order in nitrogen molecule is**

- (a) 0 (b) 1 (c) 2 (d) 3

**Que 25. Bond order in benzene is**

- (a) 1 (b) 2 (c) 1.5 (d) None of these

**Que 26. In  $\text{O}_2^-$ ,  $\text{O}_2$  and  $\text{O}_2^+$  molecular species, the total number of antibonding electrons respectively are**

- (a) 7, 6, 8 (b) 1, 0, 2 (c) 6, 6, 6 (d) 8, 6, 8

**Que 27. Hybridization and structure of  $\text{I}^{3-}$  are**

- (a)  $\text{sp}^2$  and trigonal planar (b)  $\text{sp}^3\text{d}^2$  and linear  
(c)  $\text{sp}^3\text{d}$  and linear (d)  $\text{sp}^3$  and T-shape

**Que 28. In which of the following species, all the three types of hybrid carbons are present?**

- (a)  $\text{CH}_2 = \text{C} = \text{CH}_2$  (b)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2^+$   
(c)  $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_2^+$  (d)  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_2^-$

**Que 29. Which of the following molecules has trigonal planar geometry?**

- (a)  $\text{BF}_3$  (b)  $\text{NH}_3$  (c)  $\text{PCl}_3$  (d)  $\text{IF}_3$

**Que 30. Which of the following molecules is planar?**

- (a)  $\text{SF}_4$  (b)  $\text{XeF}_4$  (c)  $\text{NF}_3$  (d)  $\text{SiF}_4$

**Que 30. Hybridization present in  $\text{ClF}_3$  is**

- (a)  $\text{sp}^2$  (b)  $\text{sp}^3$  (c)  $\text{dsp}^2$  (d)  $\text{sp}^3\text{d}$

**Que 31. Match Column-I (molecule) with Column-II (type of hybridisation) and choose the correct option from the codes given below.**

**Column-I**

**(Molecule)**

(A)  $\text{SF}_6$

(B)  $\text{PF}_5$

(C)  $\text{BCl}_3$

(D)  $\text{C}_2\text{H}_6$

**Column-II**

**(Type of hybridisation)**

(p)  $\text{sp}^3\text{d}$

(q)  $\text{sp}^3$

(r)  $\text{sp}^3\text{d}^2$

(s)  $\text{sp}^2$

(a) A – (r), B – (p), C – (s), D – (q)

(b) A – (r), B – (p), C – (q), D – (s)

(c) A – (p), B – (r), C – (q), D – (s)

(d) A – (p), B – (r), C – (s), D – (q)

**Que 32. 159. Match Column-I with Column-II and Column-III and choose the correct option from the given codes.**

**Column-I**

**Molecule**

(A)  $\text{NH}_3$

(B)  $\text{SO}_2$

(C)  $\text{SF}_4$

(D)  $\text{ClF}_3$

**Column-II**

**(No. of lone pairs and bond pairs)**

(i) 1, 2

(ii) 1, 4

(iii) 2, 3

(iv) 1, 3

**Column-III**

**(Shape of molecule)**

(p) Bent

(q) Trigonal pyramidal

(r) T-shape

(s) See-Saw

(a) A – (iv, q); B – (ii, p); C – (i, r); D – (iii, s)

(b) A – (iv, q); B – (i, p); C – (ii, s); D – (iii, r)

(c) A – (i, p); B – (iii, s); C – (iv, r); D – (ii, q)

(d) A – (iv, p); B – (i, r); C – (iii, q); D – (ii, s)

**Que 33. Match the columns**

**Column-I**

(A) HCl

(B) CO<sub>2</sub>

(C) NaCl

(D) CCl<sub>4</sub>

**Column-II**

(p) Covalent compound with directional bond

(q) Ionic compound with non-directional bonds

(r) Polar molecule

(s) Non-polar molecule

(a) A – (p, q, r), B – (q, r), C – (p, q), D – (r)

(b) A – (q), B – (r), C – (p), D – (s)

(c) A – (p, r), B – (p, s), C – (q), D – (p, s)

(d) A – (q), B – (r), C – (p, q), D – (s)

**Que 34. Assertion:** The lesser the lattice enthalpy more stable is the ionic compound.

**Reason:** The lattice enthalpy is greater, for ions of highest charge and smaller radii.

**Que 35. Assertion:** Sulphur compounds like SF<sub>6</sub> and H<sub>2</sub>SO<sub>4</sub> have 12 valence electrons around S atom.

**Reason:** All sulphur compounds do not follow octet rule

**Que 36. Assertion:** Shape of NH<sub>3</sub> molecule is tetrahedral.

**Reason:** In NH<sub>3</sub> nitrogen is sp<sup>3</sup> hybridized.

**Que 37. Assertion:** pi bonds are weaker than V bonds.

**Reason:** pi bonds are formed by the overlapping of p-p orbitals along their axes.

**Que 38. Read the following statements and choose the correct sequence of T and F from the given codes. Here T represents true and F represents false statement.**

(i) The number of dots in Lewis symbol represents the number of valence electrons.

(ii) Number of valence electrons helps to calculate group valence of element.

(iii) Group valence is given as 8 minus the number of inner shell electrons.

(a) T T T

(b) T F F

(c) T T F

(d) F F F

**Que 39. Read the following statements and choose the correct option. Here T stands for True and F stands for False statement.**



**Que 44. Strongest hydrogen bond is shown by**

- (a) water
- (b) ammonia
- (c) hydrogen fluoride
- (d) hydrogen sulphide

**Que 45. The low density of ice compared to water is due to**

- (a) induced dipole-induced dipole interactions
- (b) dipole-induced dipole interactions
- (c) hydrogen bonding interactions
- (d) dipole-dipole interactions

**Que 46. Complete the following statements. With -----(A) in bond order, -----(B) increases and -----(C) decreases.**

- (a) A = increase, B = bond length, C = bond enthalpy
- (b) A = decrease, B = bond enthalpy, C = bond length
- (c) A = increase, B = bond enthalpy, C = bond length
- (d) A = increase, B = bond angle, C = bond enthalpy

**Que 47. The correct order of dipole moments of HF, H<sub>2</sub>S and H<sub>2</sub>O is**

- (a)  $\text{HF} < \text{H}_2\text{S} < \text{H}_2\text{O}$
- (b)  $\text{HF} < \text{H}_2\text{S} > \text{H}_2\text{O}$
- (c)  $\text{HF} > \text{H}_2\text{S} > \text{H}_2\text{O}$
- (d)  $\text{HF} > \text{H}_2\text{O} < \text{H}_2\text{S}$

**Que 48. The most polar bond is**

- (a) C – F
- (b) C – O
- (c) C – Br
- (d) C – S

**Que 49. Which of the following is the electron deficient molecule?**

- (a) C<sub>2</sub>H<sub>6</sub>
- (b) B<sub>2</sub>H<sub>6</sub>
- (c) SiH<sub>4</sub>
- (d) PH<sub>3</sub>

**Que 50. Which of the following compounds does not follow the octet rule for electron distribution?**

- (a) PCl<sub>5</sub>
- (b) PCl<sub>3</sub>
- (c) H<sub>2</sub>O
- (d) PH<sub>3</sub>



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