

## ASSIGNMENT ON CHEMICAL BONDING- II

1. Discuss the shape of the following molecules using the VSEPR model:  
BeCl<sub>2</sub>, BCl<sub>3</sub>, SiCl<sub>4</sub>, AsF<sub>5</sub>, H<sub>2</sub>S, PH<sub>3</sub>
  2. Discuss the shapes of the following molecules using the VSEPR model:  
(a) SF<sub>6</sub>, (b) XeF<sub>2</sub>, (c) NH<sub>4</sub><sup>+</sup>, (d) ICl<sub>4</sub><sup>-</sup>, (e) BrF<sub>3</sub>.
  3. H<sub>2</sub>O and SO<sub>2</sub> have dipole moments. Explain the shape.
  4. Why does CH<sub>4</sub>, CCl<sub>4</sub>, SiF<sub>4</sub> and SnCl<sub>4</sub> have zero dipole moments?
  5. Why NF<sub>3</sub> has less dipole moment than NH<sub>3</sub>?
  6. Why is Pi bond weaker than a sigma bond?
  7. Discuss the shape of the following molecules using the VSEPR model:  
BeCl<sub>2</sub>, BCl<sub>3</sub>, SiCl<sub>4</sub>, AsF<sub>5</sub>, H<sub>2</sub>S, PH<sub>3</sub>, CH<sub>4</sub>, NH<sub>3</sub>.
  8. Although geometries of NH<sub>3</sub> and H<sub>2</sub>O molecules are distorted tetrahedral, bond angle in water is less than that of ammonia. Discuss.
  9. Write the resonance structures for SO<sub>3</sub>, NO<sub>2</sub> and NO<sub>3</sub><sup>-</sup>.
  10. What is meant by hybridisation of atomic orbitals? Describe the shapes of *sp*, *sp*<sup>2</sup>, *sp*<sup>3</sup> hybrid orbitals.
  11. Draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub> molecules.
  12. What is the total number of sigma and pi bonds in the following molecules? (a) C<sub>2</sub>H<sub>4</sub> (b) C<sub>2</sub>H<sub>2</sub> and (c) CO
  13. Considering x-axis as the inter-nuclear axis which out of the following will not form a sigma bond and why?  
(a) 1s and 1s (b) 1s and 2p<sub>x</sub> (c) 2p<sub>y</sub> and 2p<sub>y</sub> (d) 1s and 2s.
  14. Which hybrid orbitals are used by carbon atoms in the following molecules?  
(a) CH<sub>3</sub>-CH<sub>3</sub>; (b) CH<sub>3</sub>-CH=CH<sub>2</sub>; (c) CH<sub>3</sub>-CH<sub>2</sub>-OH; (d) CH<sub>3</sub>-CHO (e) CH<sub>3</sub>-COOH (f)
- HC≡C—C<sub>H</sub>—C<sub>H</sub>—C<sub>H<sub>2</sub></sub>—C(=O)—OH
15. Distinguish between a sigma and a pi bond.
  16. What is bond order? How does it effect the bond length and bond strength?
  16. What is the effect of the following processes on the bond order in of the following?  
(i) N<sub>2</sub> → N<sub>2</sub><sup>+</sup> + e<sup>-</sup> (ii) O<sub>2</sub> → O<sub>2</sub><sup>+</sup> + e<sup>-</sup> (iii) NO → NO<sup>+</sup> + e<sup>-</sup> (iv) CO → CO<sup>+</sup> + e<sup>-</sup>
  17. Compare the relative stability of the following species and indicate their magnetic properties: O<sub>2</sub>, O<sub>2</sub><sup>+</sup>, O<sub>2</sub><sup>-</sup>, O<sub>2</sub><sup>2-</sup>.
  18. Define Hydrogen bond. Is it weaker or stronger than the Van der Walls forces?
  19. Explain why PCl<sub>5</sub> is trigonal bipyramidal whereas IF<sub>5</sub> is square pyramidal.
  20. NH<sub>3</sub> has higher boiling point than PH<sub>3</sub>. Give reason.