INDIAN SCHOOL MUSCAT

DEPARTMENT OF CHEMISTRY

CLASS 11 2017-2018

WORKSHEET-4

CHEMICAL BONDING AND MOLECULAR STRUCTURE

1. "Atomic orbital is monocentric while a molecular orbital is polycentric". Explain.

2. What are
   a) Expanded octet molecules?
   b) Odd electron molecules?
   c) Electron deficient molecules?
   Give two examples for each.

3. Differentiate between
   a) Bond energy and Bond dissociation energy
   b) Covalent and Van der Waal's radius
   c) Bonding and antibonding molecular orbital.

4. Explain resonance and draw the resonating structures for the following :
   CO_3^{2-} , NO_3^- , SO_2 , C_6H_6

5. Give reasons:
   a) BF_3 is non-polar while NF_3 is polar.
   b) ClF_3 is T-shaped..
   c) p_x orbital does not overlap with p_y orbital.
   d) Bonds in ozone are equivalent.
   e) Oxygen is paramagnetic.
   f) Acetic acid forms dimer.
   g) Para nitro phenol has higher boiling point than ortho nitro phenol.
   h) Hydrogen bonding in HCl is insignificant.
   i) Bond angle in water is larger than bond angle in H_2S
   j) HF has a higher boiling point than HCl.

6. Explain the formation of PCl_5 and SF_6 on the basis of hybridization.

7. Write the energy level diagram for O_2^- and O_2^+. Calculate the bond order.

8. Draw orbital overlap diagram for the following:
   a)H_3O^+
   b) H_2O_2
   c) NH_3

9 Which is more polar and why: NH_3 and NF_3

10) Define the term bond length. Arrange the following in the increasing order of their bond lengths:
   Ethane, ethene, ethyne

11) Define the term bond angle. Arrange the following in the increasing order of their

bond angle: Water, ammonia, methane, carbon dioxide

12) Which hybrid orbitals are used by the carbon atoms in the following molecules?

a. CH_3-CH=CH_2
b. CH_3-CH_2-OH
c. CH_3CHO
d. CH_3COOH

13) What do you understand by formal charge of a molecule? Calculate the formal charges on all the atoms in the following molecules

i. $HClO_4$
ii. HSO_4^-

14) Discuss the shapes of the following molecules using VSEPR model
BCl_3, H_2O, XeF_4, SF_4, NH_4^+

15) Predict the hybridization in the following molecules H_2O, NH_4^+, SO_4^{2-}, ClO_3^-, IF_5