1 mark question

1. **The bond order of N_2, molecule is --------.**
   Ans: 3
   (First Term 2019-20)
2. **Among H_2O,NH_3,$CO_2$and CH_4 which molecule has the least bond angle?** *(Half Yearly 2018)*
   H_2O – 104.5°. (CO_2 – 180°, CH_4– 109.5°, NH_3–109.5 reduced to 107)

2 mark question

3. **Write any two limitations of octet rule.**
   (First Term. 2019-2020)

(i) The incomplete octet of the central atom, odd-electron molecules and the expanded octet.

(ii) Octet rule is based upon the chemical inertness of noble gases. However, some noble gases (for example xenon and krypton) also combine with oxygen and fluorine to form a number of compounds like XeF_2 , KrF_2 , $XeOF_2$ etc.,

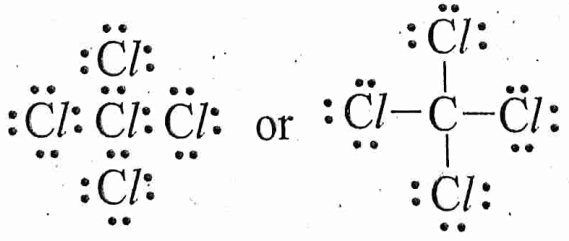
(iii) This theory does not account for the shape of molecules.

(iv) It does not explain the relative stability of the molecules being totally silent about the energy of a molecule. (Any two)

4. **Draw the Lewis dot structures of N_2 and CCl_4.**
   (First Term. 2019-20)

The Lewis Representation of N_2 is: :N ≡ N:

The Lewis Representation of CCl_4 is:



5. **Among NaCl, $BeCl_2$ and $AlCl_3$, which one is more covalent? Justify the answer.** *(March 2019)*
   $AlCl_3$ or $BeCl_2$. Covalent character increases as charge on cation increases.

6. **Write any two limitations of octet rule.** *(SAY 2018)*

Refer to Q.No. 3

7. **By using the concept of hybridization, explain the structure of H_2O molecule.** *(March 2018)*

In H_2O molecules the 4 oxygen orbitals (one 2s and three 2p) undergo sp^3 hybridisation. The four sp^3 hybrid orbitals acquire a tetrahedral geometry, with two corners occupied by hydrogen atoms while other two by the lone pairs. Thus, the bond angle is reduced to 104.5° from 109.5° and the molecule thus acquires a v-shape or angular geometry.

3 mark question

8. **(a) Give two examples of compounds having expanded octet.**

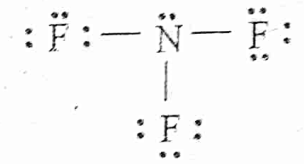
(b) Draw the Lewis dot symbols of

(i) Cl_2 (ii) NF_3 *(March 2020)*

(a) PF_5 /PCl_5, SF_6, H_2SO_4 / Compounds of elements in and beyond third period

(b) Cl_2

NF_3



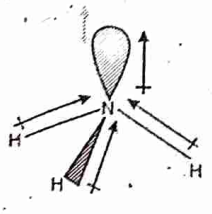
9. **The geometry of NH_3 and NF_3 is pyramidal.**

a) **Among the dipole moment values 4.9×10^{-30}Cm and 0.8×10^{-30} Cm, which one corresponds to that of NH_3.**

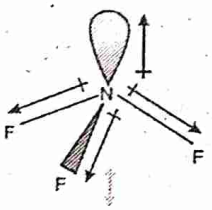
b) **Explain the reason for the difference in dipole moment of NH_3 and NF_3.** *(Half Yearly 2018)*

(a) 4.9×10^{-30}Cm

(b) NH_3 has higher dipole moment than NF_3. F is more electronegative than N, therefore direction of bond is from N to F whereas N is more electronegative than H in NH_3, so the direction of bond is from H to N. Thus, the resultant dipole moment of 3N H bonds adds up to the bond moment of lone pair, of that of 3 N – F bonds partly cancels the resultant moment of lone pair. Hence, the net dipole moment of NF_3 is less than that of NH_3.



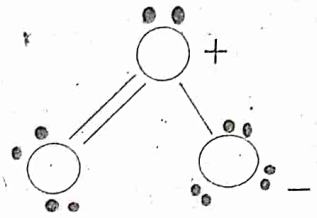
Resultant of 3 N – H bonds



Resultant of 3 N – F bonds

1 mark questions

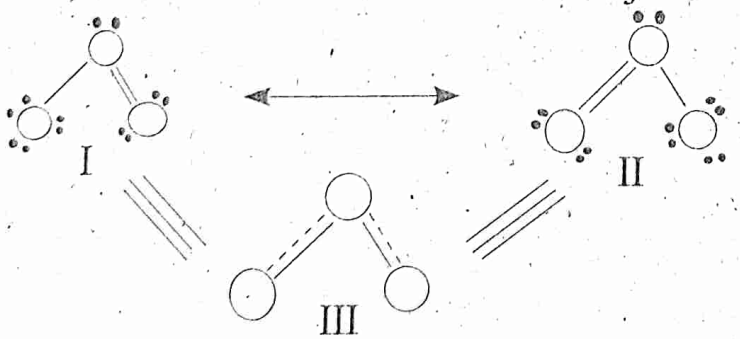
10. Which of the following molecules is covalent?
    (a) H_2 (b) CaO (c) KCl (d) Na_2S
    Ans: (a) H_2
11. Carbon tetrachloride has no net dipole moment, because
    (a) its structure is planar
    (b) its regular tetrahedral structure
    (c) similar size of carbon structure
    (d) similar electron affinities of carbon and chlorine
    Ans: (b) its regular tetrahedral structure
12. Draw the Lewis dot structure of O_3 molecules.



13. The amount of energy required to break one mole of bonds of a particular type between two atoms in a gaseous state. This statement is related to (Bond length, Bond angle, Bond order, Bond enthalpy)
    Bond enthalpy

2 mark questions

14. Draw the resonance structures of O_3 molecules.



15. Electrovalent compounds are formed between strongly electropositive metal elements and strongly electronegative elements. What are the factors, which favour the formation of electro - valent bonds?
    The main factors which favour the formation of ionic bonds are,
    (a) Low ionisation energy of the metal atom.
    (b) High electron affinity of non-metal atom.
    (c) High lattice energy of the compound formed.