Chemical Bonding - I & II

Date Planned : __ / __ / __	CBSE Pattern	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 0	Exact Duration :_____

Short Answer Type-I (2 Marks)

1. What does bond length exactly mean? Are double bonds stronger than single one?

2. Why is the bond angle of water less than the bond angle of CH_4?

3. Does bond length decrease as bond order increases?

4. Give the formula of a fluoride molecule that:

(a) is octahedral in shape

(b) is trigonal bipyramidal in shape

(c) is T-shaped

5. Match each molecule with its molecular geometry according to VSEPR theory:

(a) NH_4^+ **(b)** N_3^- **(c)** CO_3^{2-} **(d)** SO_2

The choices are linear, angular, trigonal planar and tetrahedral.

6. Explain the structure of methane.

7. Give an example of a molecule exhibiting sp^3d^2 hybridisation. How is it possible for d-orbitals to mix with lower energy *s* and *p* orbitals?

8. Explain how hydrogen bonds contribute to water's high specific heat.

9. Can acetone $\left(CH_3COCH_3\right)$ participate in hydrogen bonding? If yes, does acetone function as a hydrogen donor or a hydrogen acceptor, or both?

10. Out of NaCl and MgO, which has higher lattice energy and why?

11. Why NaCl gives a white precipitate with $AgNO_3$ solution but CCl_4 does not?

12. Out of σ and $\pi-$bonds, which one is stronger and why?

13. What order of $C-H$ bond lengths do you expect in C_2H_6, C_2H_4 and C_2H_2 and why?

Short Answer Type-II (3 Marks)

14. Define bond length and bond energy and state the relationship between the two.

15. Arrange the F_2, F_2^+ and F_2^- in increasing order of bond energies.

16. Determine the bond order, number of unpaired electrons, and magnetic character for O_2, O_2^+, O_2^-

17. The bond dissociation energy of N_2^+ is less than that of N_2. Show why this is the case.

18. Is it possible for Ne_2 and F_2^- to exist?

19. Calculate formal charge on each O-atom of O_3 molecule.

20. Calculate the percent ionic character of HCl. Given that the observed dipole moment is 1.03 D and bond length of HCl is 1.275 Å .

21. Arrange the following in order of decreasing bond angles

(i) $CH_4, NH_3, H_2O, BF_3, C_2H_2$ **(ii)** NH_3, NH_2^-, NH_4^+

Long Answer Type (5 Marks)

22. List five phenomena that result from hydrogen bonding.

23. Draw the Lewis dot structure of CO molecules.

24. Write the Lewis structure of nitrite ion, NO_2^-.

25. Draw the Lewis dot structure of CO_3^{2-} ion.