IIT FOUNDATION
WEEK TEST – 9

CHEMISTRY

SINGLE CORRECT CHOICE: **TOTAL MARKS: 24**

1. Number of sigma bonds and pi bonds present in butane are :
   1) $12\,\sigma$, $1\,\pi$ 2) $13\,\sigma$, $0\,\pi$ 3) $0\,\sigma$, $13\,\pi$ 4) $11\,\sigma$, $2\,\pi$

2. Number of sigma and pi bonds present in calcium carbide are :
   1) $3\,\sigma$, $1\,\pi$ 2) $3\,\sigma$, $3\,\pi$ 3) $3\,\sigma$, $2\,\pi$ 4) $3\,\sigma$, $4\,\pi$

3. Number of sigma and pi bonds present in $O = C = O$ are :
   1) $1\,\sigma$, $1\,\pi$ 2) $2\,\sigma$, $2\,\pi$ 3) $3\,\sigma$, $3\,\pi$ 4) $4\,\sigma$, $4\,\pi$

4. Number of sigma and pi bonds present in ethene are :
   1) $5\,\sigma$, $2\,\pi$ 2) $5\,\sigma$, $1\,\pi$ 3) $3\,\sigma$, $2\,\pi$ 4) $4\,\sigma$, $2\,\pi$

5. Cl -P-Cl bond angles in PCl_5 molecule are
   1) 120' and 90'   2) 60' and 90'   3) 60° and 120°   4) 120° and 30°

6. The largest bond angle is in
   1) AsH_3 2) NH_3 3) H_2O 4) PH_3

7. According to the VSEPR theory, which of the following gives the correct order of repulsion between electron pairs around a central atom?
   1) Bond pair–bond pair > lone pair–bond pair > lone pair–lone pair
   2) Lone pair–bond pair > lone pair–lone pair > bond pair–bond pair
   3) Lone pair–lone pair > lone pair–bond pair > bond pair–bond pair
   4) Bond pair–bond pair = lone pair–lone pair = lone pair–bond pair

8. In NH_3, the central atom N has 5 valence electrons and forms three N–H single bonds. According to VSEPR theory, what is the shape of the NH_3 molecule?
   1) Linear   2) Trigonal planar   3) Trigonal pyramidal   4) Tetrahedral

MULTIPLE CORRECT CHOICE: **TOTAL MARKS: 16**

9. Which is/are characteristics of Pi bond?
   1) Pi –bond is formed when a sigma bond is already formed.
   2) Pi-bonds are formed by un hybrid orbitals.
   3) Pi-bonds may be formed by the overlapping of P-Orbitals.
   4) Pi-bonds results form lateral overlap of atomic orbitals

10. Which statement is /are correct
    1) Sigma bond is stronger than pi bond.
    2) Sigma bond is formed by the axial overlapping of orbitals.
    3) Sigma bond is weaker than pi bond.   4) Pi bond can exist independently.

11. Which of the following molecules is/are not linear?
    1) CO_2 2) NO_2 3) SO_2 4) ClO_2

12. In which of the following molecules have all the following?
    P) 2 bond pairs   Q) 1 lone pairs
    R) Angular or bent shape S) Bond angle <120°
    1) SO_2 2) $SnCl_2$ 3) $PbCl_2$ 4) BCl_3

PASSAGE TYPE: **TOTAL MARKS: 20**

The covalent bond formed with the linear over lap of atomic orbitals along the inter nuclear axis is known as Sigma bond. The covalent bond formed by the lateral overlap and side wise overlap of two

atomic orbitals perpendicular to inter nuclear axis is known as Pi- bond. A sigma bond can exist independently. The shapes of molecules depend only on sigma bonds but not on Pi bonds; d-orbitals can form Pi bonds

13. Which of the following statement is not correct?

1) Double bond is stronger than a single bond.

2) Sigma bond is weaker than a Pi bond

3) Triple bond is stronger than double bond

4) Pi bond is more reactive than Sigma bond

14. Generally Pi bond is formed from the lateral overlap of one

1) s-s orbitals   2) P-P Orbitals   3) d-d orbitals   4) Both 2 and 3

15. When the orbitals overlap unsymmetrically _____ bond is formed

1) Sigma   2) Covalent   3) Pi-Bond   4) Hydrogen

VSEPR theory is applicable to simple molecules or ions of non-transitional elements. In VSEPR theory, the electron pairs on the central atom are considered as point charges. Due to repulsions among the electron pairs, they are arranged in space around the central atom such that the repulsions are minimum. Order of repulsions among various electron pairs is lone pair – lone pair > lone pair – bond pair > bond pair – bond pair. Presence of lone pairs at the central atom causes distortion to the regular shapes and deviation in bond angles.

16. In which of the following, the central atom has same number of lone pairs as on P in PCl_3?

1) BCl_3 2) NCl_3 3) CCl_4 4) PCl_5

17. Which of the following does not have a lone pair of electrons?

1) H – Cl   2) H–O–H   3) NH_3 4) NH_4^+

INTEGER(NUMERICAL VALUE):   **TOTAL MARKS: 4**

18. In H_2O, the central atom O has 6 valence electrons and forms two O–H single bonds. According to VSEPR theory, how many total electron pairs (bond pairs + lone pairs) are present around the central oxygen atom? Give your answer as an integer.

MATRIX MATCH: **TOTAL MARKS: 16**

19. **COLUMN-I**   **COLUMN-II**

a) Sigma bond   p) Side wise overlap of atomic orbitals

b) Pi bond   q) Linear overlap of atomic orbitals

c) H_2 r) Fluorine molecule.

d) N_2 s) Nitrogen molecule

        t) Carbondioxide molecule

20. **COLUMN-I**   **COLUMN-II**

a) AB_2 p) Tetrahedral

b) AB_3 q) Octahedral

c) AB_4 r) Trigonal bi pyramidal

d) AB_5 s) Trigonal planar

        t) Linear