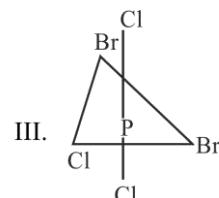
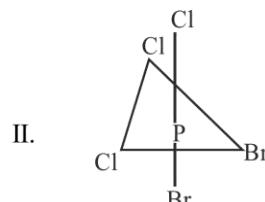
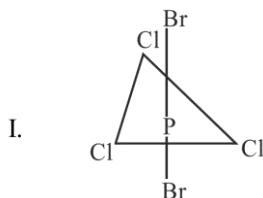


## DPP-03

## Single Correct Type

1.  $\text{PBr}_2\text{Cl}_3$  can exhibit geometrical isomerism, Geometrical isomers are as follows:



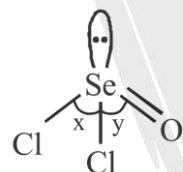
Which of the above mentioned geometrical isomer(s) has/have no dipole(s)?

- (A) Only II and III  
 (B) Only III  
 (C) Only I and III  
 (D) Only I

2. Which of the following statement is true for  $\text{IO}_2\text{F}_2^-$ :

- (A) The electrons are located at the comers of a trigonal bipyramidal but one of the equatorial pairs is unshared.  
 (B) It has  $\text{sp}^3\text{d}$  hybridisation and is T-shaped.  
 (C) Its structure is analogous to  $\text{SF}_4$   
 (D) (a) and (c) both

3. Select the correct order of bond angle in  $\text{SeOCl}_2$



- (A)  $x > y$       (B)  $x < y$       (C)  $x = y$       (D) Can't predict

4. Which compound has the smallest bond angle in each series.

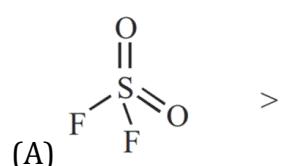
- |                          |                     |                     |
|--------------------------|---------------------|---------------------|
| (i) (P) $\text{OsF}_2$   | (Q) $\text{OsCl}_2$ | (R) $\text{OsBr}_2$ |
| (ii) (P) $\text{SbCl}_3$ | (Q) $\text{SbBr}_3$ | (R) $\text{SbI}_3$  |
| (iii) (P) $\text{PI}_3$  | (Q) $\text{AsI}_3$  | (R) $\text{SbI}_3$  |
- (A) P,P,R      (B) P,R,R      (C) P,P,P      (D) P, R, P

5. Which of the following statement is correct about  $\text{PCl}_3$ ?

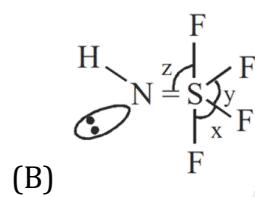
- (A)  $\text{P}-\text{Cl}_{\text{ax}}$  is longer than  $\text{P}-\text{Cl}_{\text{eq}}$ .  
 (B) All the hybrid orbitals of P-atom having bond pairs are identical to each other.  
 (C)  $\text{P}-\text{Cl}_{\text{ax}}$  is shorter than  $\text{P}-\text{Cl}_{\text{eq}}$ .  
 (D) Maximum 4 atoms in a plane and 4 such planes are present

## More than One Correct Type

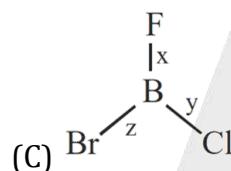
6. Select the correct statement(s) about Bent's rule : -
- The more electronegative atom or group will withdraw the bonding pair more from the central atom to itself.
  - more ionic character in a bond leads to the utilisation of hybrid orbitals containing more p-character of the central atom.
  - The central atom projects the hybrid orbital of more s-character towards the bond where covalency is very strong.
  - p-orbital enriched hybrid orbital of the central atom is concentrated along the strong covalent bonds.
7. Which of the following order is/are correct



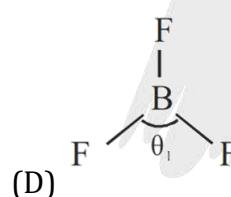
(S = O bond length)



(x > y > z) (order of bond angle)



% of s-character in B-X bond  
(x > y > z) (x = F, Cl, Br)



(order of bond angle)

8. Which of the following compound(s) is/are having non equivalent hybrid orbitals
- CH<sub>4</sub>
  - SiCl<sub>4</sub>
  - NH<sub>3</sub>
  - XeF<sub>4</sub>

## Passage for Q. 9 to Q. 10

Bond length is the average distance between the nuclei of the two atoms held by a bond. This represents the internuclear distance corresponding to minimum potential energy for the system. Main factors which affect the bond length are given below :

- Multiple bonds are shorter than corresponding single bonds



- (ii) Sometimes single bond distances are somewhat larger than double of their respective covalent radii (e.g.  $F_2$ ). It is due to strong repulsive interaction between the lone-pair electrons on adjacent atoms.
- (iii) Sometimes single bond distances are somewhat shorter than double of their respective covalent radii because bonds acquire some partial double bond character. This normally happens when one atom having vacant orbital and another atom containing lone pair. It is also possible it become shorter due to high ionic character in the covalent bond.
- 9.** Which of the following statement is true about the N – N bond length among the following species
- I.  $H_2N - NH_2$       II.  $N_2$       III.  $NH - \overset{+}{NH}_2$       IV.  $N_2O$
- (A) N – N bond length is shortest in II  
 (B) N – N bond length in I is shorter than that of in III  
 (C) N – N bond length in III is shorter than that of in I  
 (D) N – N bond length in IV is intermediate between I and III
- 10.** The bond angle in  $Cl_2O$  is more than that in  $F_2O$ , the reason behind this may be :
- I. Due to steric repulsion between chlorine atoms.  
 II. There is no lp – lp repulsion in  $Cl_2O$  which is present in  $F_2O$ .  
 III. F is more electronegative than Cl
- The correct reason is (are)
- (A) both I and III      (B) only I      (C) only II      (D) all the three



**ANSWER KEY**

1. D    2. D    3. B    4. A    5. B    6. ABC    7. D  
8. CD    9. AC    10. A

