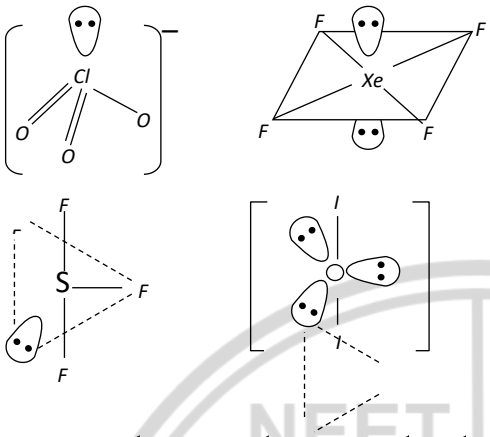
Co-ordinate or Dative bonding

1. (d)



2. (b) H_2SO_4 has co-ordinate covalent bond.

$$H-O-\underset{\uparrow}{\underset{O}{S}}-O-H$$
$$\underset{\downarrow}{O}$$

3. (c) NH_3 has lone pair of electron while BF_3 is electron deficient compound so they form a co-ordinate bond. $NF_3 \rightarrow BF_3$

4. (d) HNO_2 does not have co-ordinate bond. Structure is $H-O-N=O$.

5. (c) **Donation of electrons**

Explanation:

In a **coordinate covalent bond** (also called a **dative bond**), one atom **donates a lone pair of electrons** to another atom that has an **empty orbital**.

Example: In **NH_4^+**, the nitrogen atom donates its lone pair to a proton (H^+) to form a coordinate bond.

6. (b) **Electrons of one atom are shared with two atoms**

Explanation:

In **coordinate bonding**, both shared electrons come from **one atom** (the donor), while the other atom (the acceptor) contributes **no electrons** but shares in the pair.

Hence, **the electrons of one atom are shared between two atoms** in a coordinate covalent bond.

7. (a) Structure of N_2O_5 is $O=\underset{\downarrow}{\underset{O}{N}}-O-\underset{\downarrow}{\underset{O}{N}}=O$.

8. (d) **One or more unshared electron pair**

Explanation:

A **coordinate covalent bond** (or **dative bond**) is formed when one atom **donates a lone pair of electrons** to another atom or ion that has an **empty orbital**.

Thus, the atom that forms a coordinate bond must have **one or more unshared (lone) pairs of electrons** available for donation.

Example:

In **NH_4^+**, the nitrogen atom donates its lone pair to H^+ to form a coordinate bond.

9. (a) SO_3^{2-} has one coordinate bond. $^{-}O-\underset{\downarrow}{\underset{O}{S}}-O^{-}$

10. (d) Co-ordinate bond is a special type of covalent bond which is formed by sharing of electrons between two atoms, where both the electrons of the shared pair are contributed by one atom. Since this type of sharing of electrons exits in O_3, SO_3 and H_2SO_4. Therefore all these contains coordinate bond.

11. (c) **2**

Explanation:

In **H_2SO_4**, the sulphur atom forms:

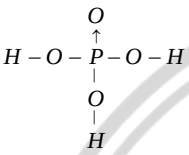
- Two **S=O double bonds** (each with one coordinate bond from oxygen to sulphur), and
- Two **S–OH single bonds**.

Each double bond involves **one normal covalent bond** and **one coordinate bond**, where oxygen donates a lone pair to sulphur.

Hence, the **number of coordinate (dative) bonds** in a sulphuric acid molecule is **2**.

12. (a) $CH_3N \equiv C$ contain dative bond.

13. (a) H_3PO_4 is orthophosphoric acid.



14. (b) Co-ordinate covalent

Explanation:
In $(C_2H_5)_2OBH_3$, the oxygen atom of diethyl ether $((C_2H_5)_2O)$ has lone pairs of electrons, while boron in BH_3 is electron-deficient (it has only six electrons in its valence shell).
The oxygen atom donates a lone pair of electrons to boron, forming a co-ordinate (dative) covalent bond between B and O.

Hence, the B–O bond in $(C_2H_5)_2OBH_3$ is a **co-ordinate covalent bond**

15. (c) Sulphuric acid contain, covalent and co-ordinate bond.