Co-ordinate Bond

Co-ordinate bond is a type of alternate covalent bond that is formed by sharing of electron pair from a single atom. Both shared electrons are donated by the same atom. It is also called dative bond or dipolar bond.

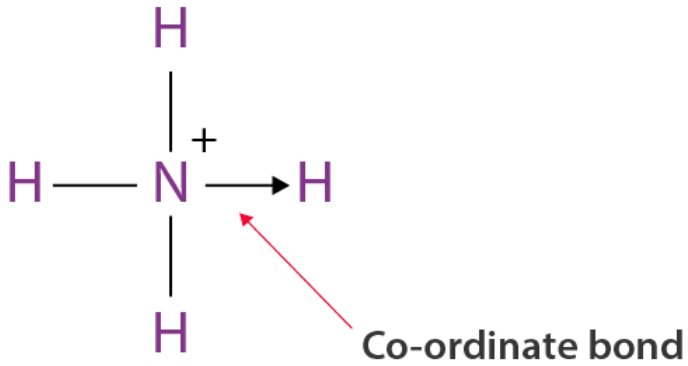
Co-ordinate covalent bonds are usually formed in reactions that involve two non-metals such as a hydrogen atom or during bond formation between metals ions and ligands.

Characteristics of Coordinate Covalent Bond

1. In this type of bonding, the atom that shares an electron pair from itself is termed as the donor.
2. The other atom which accepts these shared pair of electrons is known as a receptor or acceptor.
3. The bond is represented with an arrow→, pointing towards acceptor from the donor atom.
4. After sharing of electron pain each atom gets stability.
5. This type of bonding is central to the Lewis theory.
6. Getting a good understanding of coordinate covalent bonds can help in properly designing complex organic molecules.

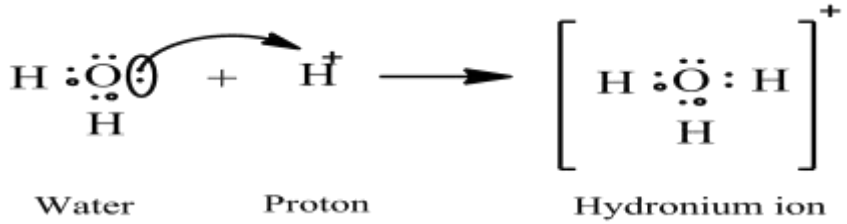
Coordinate Bond Diagram

Below we have given a simple diagram of a coordinate bond. The bond is shown by an arrow which points in the direction where an atom is donating the lone pair to the atom that is receiving it.



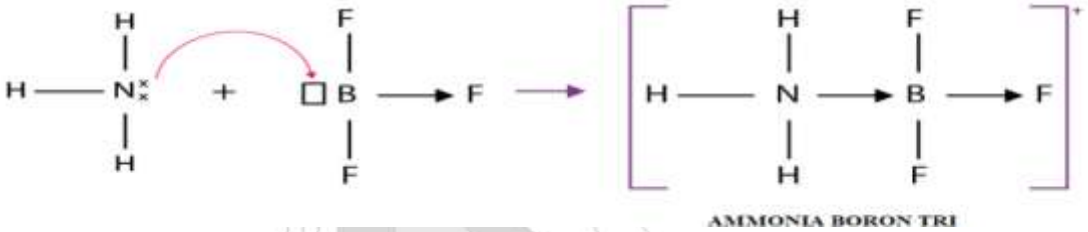
Formation of Hydronium ion

An oxygen atom in water donates its one pair of electrons to the vacant orbital of H^+ ion thus a dative bond is formed oxygen atom is donor atom and H^+ acceptor atom.



Formation of Ammonia Boron Tri-fluoride

The nitrogen atom in Ammonia donates one pair of electrons to the vacant orbital of Boron atom in Boron tri-fluoride thus nitrogen atom is donor atom and boron atom is acceptor.



Properties of Coordinate Compounds

1. These have lower melting and boiling points than ionic compounds.
2. Some of these compounds exhibit isomerism.
3. Sharing of electrons takes place in a definite direction, hence, it is a directional bond.
4. It is weaker than ionic bonding.