Redox Reactions

Oxidation is always accompanied by reduction.

Oxidation: Loss of electron(s) by any species

Reduction: Gain of electron(s) by any species

Oxidising agent (oxidant): Acceptor of electron(s)

Reducing agent (reductant): Donor of electron(s)

Oxidation number:

It denotes the oxidation state of an element in a compound.

Rules for the calculation of oxidation state of an element are as follows:

- The oxidation number of the element in the free or the uncombined state is zero.
- For the ions composed of only one atom, the oxidation number is equal to the charge on the ion.
- The algebraic sum of the oxidation number of all the atoms in a compound must be zero.
- For polyatomic ions, the algebraic sum of the oxidation number of all the atoms in a compound must be equal to the charge on the ion.

Balancing of redox reaction:

- Oxidation number method: It is based on the change in the oxidation number of reducing agent and the oxidising agent.
- Half-reaction method (Ion-electron method): The two half-equations are balanced separately and then added together to give a balanced equation.

Redox reactions and electrode processes:

- Redox couple → Oxidised and reduced form of a substance together taking part in an oxidation or reduction half reaction
- Electrode potential → Potential associated with each electrode
- Standard electrode potential → When concentration of each species is unity, pressure is 1 atm, and temperature is 298 K

The standard electrode potential E^o of hydrogen electrode is 0.00 Volts.

The redox couple with a negative E^o is a stronger reducing agent than the H^+/H_2 couple.

The redox couple with a positive E^o is a weaker reducing agent than the H^+/H_2 couple.

Daniell Cell: