Thermo electric effect

- Thermoelectric effect is the phenomenon of production of electrical energy from thermal energy.
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The effects of thermoelectric effect are:

- Seeback effect
- Peltier effect
- Thomson effect

Thermocouple

- Thermocouple is a pair of dis similar metallic wires joined at the end.

Thermo electric series

Work Function

- Work function is the minimum amount of work to be done to just remove the valance electron from an atom.
  - In photoelectric effect electrons are removed by photons.

Definition

- Thermoelectric series is the arrangement of metals.
- A pair metals in the series form a thermocouple.
- Current flows from former to later in the cold junction.

The thermoelectric series is:

- **Antimony** > **Iron** > **Zinc** > **Silver** > **Lead** > **Copper** > **Platinum** > **Bismuth**

- The thermoelectric effect of lead is almost 0 .
- Lead is taken as the reference metal in the series.
- **Relation:** The greater the separation of metals in the series the greater is the thermal emf produced.
  - Antimony Bismuth thermal $e.m.f$ is preferred.

Seeback effect

- Seeback effect is the phenomenon of production of electrical energy by keeping the two junctions of thermocouple at different temperatures.
- **Thermo** $e.m.f$. Thermo emf is the emf produced by keeping the junctions of a thermocouple at different temperatures.
- **Thermo current**: Thermo current is the current produced by keeping junctions of a thermocouples at different temperatures.

Factors affecting emf and current in thermocouple

The magnitude and direction of current and emf in a thermocouple depend on:

- nature of metals forming thermocouples.
- temperature difference between the two junctions.

Cause of seeback effect

The cause of seeback effect are illustrated below:

- Seeback effect occurs due to:
  - diffusion of electrons form low work function to high work function.
- The diffusion rate depends on temperature difference between the junction.
- There is net thermo emf at different temperature of the junctions.
  - The diffusion rate is higher at hot junction.
  - The diffusion rate is same for both junction at same temperature.

    * The contact emf of both junction is same at same temperature.
    * There is no net themro emf at same temperature.

Reversibility of Seeback Effect

- Seeback effect is reversible effect.
  - The direction of thermo electric current reverses on changing hot and cold junctions.

Pelteir Effect

Statement:

- When electric current is passed through the thermocouple having both junctions at same temperature, heat is evolved at one junction and absorbed at another junction.

The factors affecting amount of heat are:

- Heat is directly proportional to current.

$$H \alpha I$$

- Heat doesnot depend on resistance.