

Chapter 11

Principles of Metallurgy

Purification of crude metals:

The crude metal obtained after reduction technique used contains some impurities. The process of removal of these impurities from crude metal to obtain pure metal is known as refining.

Ex. Blister copper contains copper sulphide, iron and sulphur as impurities. These impurities can be removed by refining.

- Refining involves different methods like distillation, poling, liquation, electrolytic refining etc.

Distillation:

This method is used for low boiling metals having high boiling impurities.

Metals like Zinc (Zn) can be purified by distillation.

- Molten metal is distilled off so that vapours of the metal can be collected separately and condensed to obtain pure metal.

Poling:

Molten metal is stirred and heated. Stirring is done with large poles of green wood, which contains substances like hydrocarbons, which are oxidizing agents and oxidise impurities.

Impurities gets removed in the form of gases.

Ex. Blister copper is purified by poling.

Liquation:

It is used for metals with low boiling points. Crude metal to be purified is placed on sloppy surface and heated from bottom. Metal with low melting point melt readily and slops down and pure metal can be collected.

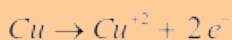
Electrolytic refining:

The impure metal in its solid form will be taken as anode. Small strip of same pure metal will be taken as cathode. Suitable electrolytic solution is taken.

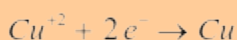
During electrolysis, metal undergoes oxidation at anode and dissolves into solution. Reduction at cathode and gets deposited. The impurities will be collected at bottom of anode in the form of anode mud.

Ex. Copper can be purified by this method.

Impure solid copper is made as anode. A small strip of pure copper is taken as cathode. Copper sulphate (CuSO_4) is taken as electrolytic solution. At anode copper undergoes oxidation to produce Cu^{+2} ions.



Similarly, at cathode Cu^{+2} ions from solution will be deposited by undergoing reduction.



We can use electrolytic refining for least reactive metals or precious metals like copper, silver, gold etc.,

