This method is used for the separation of lead sulphide (good conductor) which is charged
immediately in an electrostatic field and is thrown away from the roller from zinc sulphide
(poor conductor) which is not charged and hence, drops vertically from the roller.

Chemical Method-Leaching

Leaching is the process in which the ore is concentrated by chemical reaction with a suitable
reagent which dissolves the ore but not the impurities, e.g., bauxite is leached with a hot
concentrated solution of NaOH which dissolves aluminium while other oxides (Fe_2O_3, TiO_2,
SiO_2), remain undissolved and noble metals (Ag and Au) are leached with a dilute aqueous
solution of NaCN or KCN in the presence of air.

$$\underset{\text{bauxite}}{Al_2O_3 \cdot 2H_2O} + 2NaOH \longrightarrow \underset{\text{sod. meta aluminate}}{2NaAlO_2} + 3H_2O$$

and

$$\underset{\text{argentite}}{Ag_2S} + 4NaCN \longrightarrow 2Na[Ag(CN)_2] + Na_2S$$

sod. argento cyanide

Extraction of Crude Metals from Concentrated Ore

The concentrated ore is usually converted to oxide before reduction, as oxides are easier to
reduce. Thus, isolation of crude metal from concentrated ore involves two major steps.

1. Conversion to oxide.
2. Reduction of the oxides to metal.

Conversion to Oxides

(i) Calcination It is the process of converting an ore into its oxides by heating it strongly,
below its melting point in a limited supply of air or in absence of air.
During calcination, volatile impurities as well as organic matter and moisture are removed.

gently heated. The metal melts and flows down leaving behind the non-fusible impurrties.

(ii) Distillation This is useful for low boiling metals such as Zn, Hg. The impure liquid metal is
evaporated to obtain the pure metal as distillate.

(iii) Cupellation

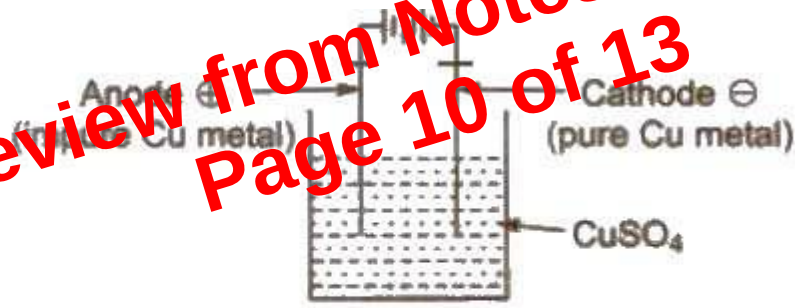
This method is used when impure metal contains impurities of other metals which form volatile
oxides.
e.g., traces of lead ore removed from silver (as volatile PbO) by this process.

Chemical Methods

(i) Poling This method is used when the impure metal contains impurities of Its own oxide,
e.g., CU_2O in blister copper and SnO_2 in impure Sn. The molten impure metal is stirred with
green wood poles. At this high temperature. wood liberates gases such as CH_4 which reduces
any oxides present in the metal.

(ii) Electro-refining

In this method, impure metal forms the anode while the cathode is a rod or sheet of pure metal.
The electrolytic solution consists of a soluble salt of the metal.



Anode, $Cu \longrightarrow Cu^{2+} + 2e^-$

Cathode, $Cu^{2+} + 2e^- \longrightarrow Cu(s)$

On passing electricity, the pure metal gets deposited on the cathode while the insoluble
impurities settle down below the anode as anode mud or anode sludge. Metals like Cu, Ag, Au,
Cr, Zn, Ni, etc are purified by this method.

(iii) Zone-refining This method is based upon the principle of fractional crystallisation, i.e.,
difference in solubilities of impurities in molten and solid state of metal. Semiconductors like