



150k now
Rankers
Result does not determine
March
agj

20-50k
rank will
improve

13 Surprise
150 minute

will change
your life

Never before
in IIT history

IOC Mega Revision

Start

• **Live** at 8:00 PM

1st March - 13th March



Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

What you get inside eSaral course?

bullish => aapka dhyaan

270 280
100 100 100

➤ Study from Kota's **Top IITian Faculties**

➤ **650+ Hours of PCM Videos Lectures** with best Visualisation *most personalised courses*

➤ **30000+ Solved Qs**

➤ **Personalised date wise Time-table**

➤ **Live 4-Layered Doubt Solving System**

➤ **Personalised 3-Layered One to One Mentorship**

➤ **115 Fully Solved Topic wise segregated**

Practice Sheets with homework index & video solutions

➤ **Solved Prev 10 years Chapterwise Qs**

➤ **Quick Revision Video Lectures and 90+ Mind Maps**

➤ **97 JEE Main and 94 JEE advanced 1hr Topic wise Tests**

➤ **3 Hour Regular Review tests and Test Series**

➤ **Instant Test Analysis Report**

➤ **Regular Motivation and Strategy Sessions**

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play

Bounce Back

128 GB SD Card
Included

JEE Main

For March, April and
May Attempt



50% OFF for first 300 Students ONLY

Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

Bounce Back

128 GB SD Card
Included

JEE



Main+Advanced



50% OFF for first 300 Students ONLY

Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play



Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

Complete Chemistry Mega Revision Timetable

✓
1 March

Coordination
Compounds

✓
3,4 March

Chemical
Bonding

✓
5 March

p-block
(Class 12)

✓
6 March

p-block (class 11)
+ Periodic Table

✓
8 March

Metallurgy

10 March

s-block
+ Hydrogen

12 March

d & f-block

13 March

 **Surprise Gift** 

Complete Chemistry Mega Revision PYQs & Quiz Timetable

High Marks

1) Biswajeet 2) Shubham 3) Mehm

2 March

Coordination
Compounds

PYQs

Quiz

4 March

Chemical Bonding

PYQs

Quiz

5 March

p-block (Class 12)

PYQs

Quiz

7 March

p-block (class 11)
and Periodic Table

PYQs

Quiz

11 March

Metallurgy

PYQs

Quiz

12 March

s-block + Hydrogen

PYQs

Quiz

13 March

d & f-block

PYQs

Quiz



ईश बढ़ेगी
युग्म बढ़ेगा



I Love Chemistry

Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

Quiz, PYQs free

Samjho, dekho & yaad karo

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play

Metallurgy

Industrial

fever
cold
Cough



Money

११११

Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

Ore

Cycle



Impure
Material

Beneficiation
of Material

Conversion
to Oxides

Reduction to
Metal

Purification

Metal



The compound of a metal found in nature is called a mineral.

The minerals from which metal can be economically and conveniently extracted are called ores.

All minerals are not ores but all ores are minerals.

Fe



ORES

Native Ores (unreactive)

Silver, gold, platinum
etc, occur as **native ores**.

Al, Fe

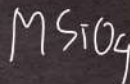
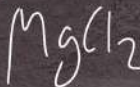
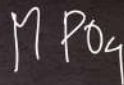
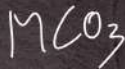
Pb, Na, Mg

Combined Ores

They contain the metal in
combined form.

(i) Oxidised ores

Oxide ores, Carbonate ores,
Sulphate ores, Phosphate
ores, Silicate ores.



(ii) Sulphurised Ores

These ores consist of sulphides
of metals like Iron, Lead, Zinc,
Mercury etc.



(iii) Halide Ores

These ores consist of halides
of metals.

An ore is usually contaminated with earthy or undesired materials known as **gangue**.

gange

Mines

Extract

mitti, garbage, impurities

Physical Separation

Concentration of The Ore

100 kg ore

0.2 - 1 kg metal



The removal of unwanted, useless impurities from the ore is called Dressing or Concentration or Beneficiation of ore.

Physical Separation Method

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play

Hydraulic washing or Gravity separation or Levigation method

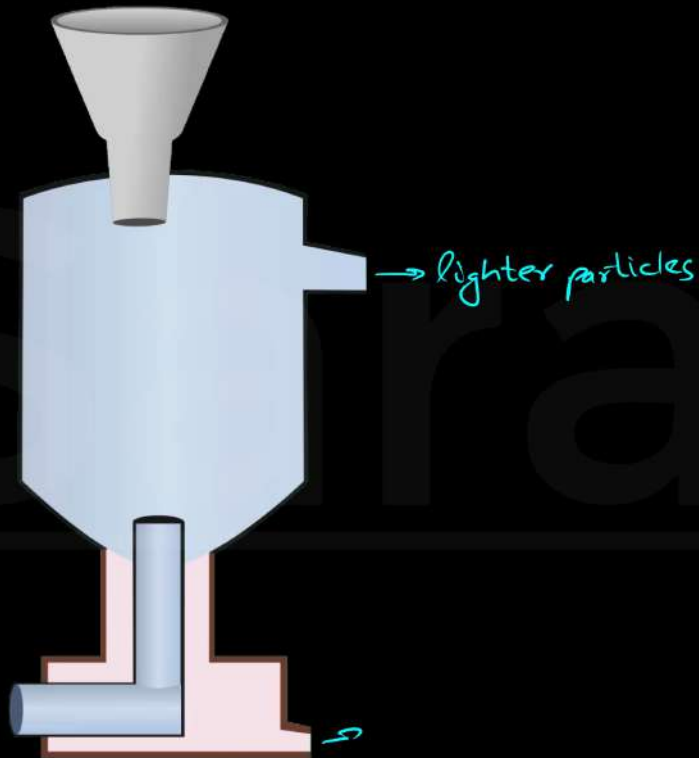
① Crushing → $\frac{d}{2}$

Fe_2O_3
d

Gold
d

It is based on the difference in the densities of the gangue and ore particles.





Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

This method is generally used for the concentration of oxide and native ores.

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play

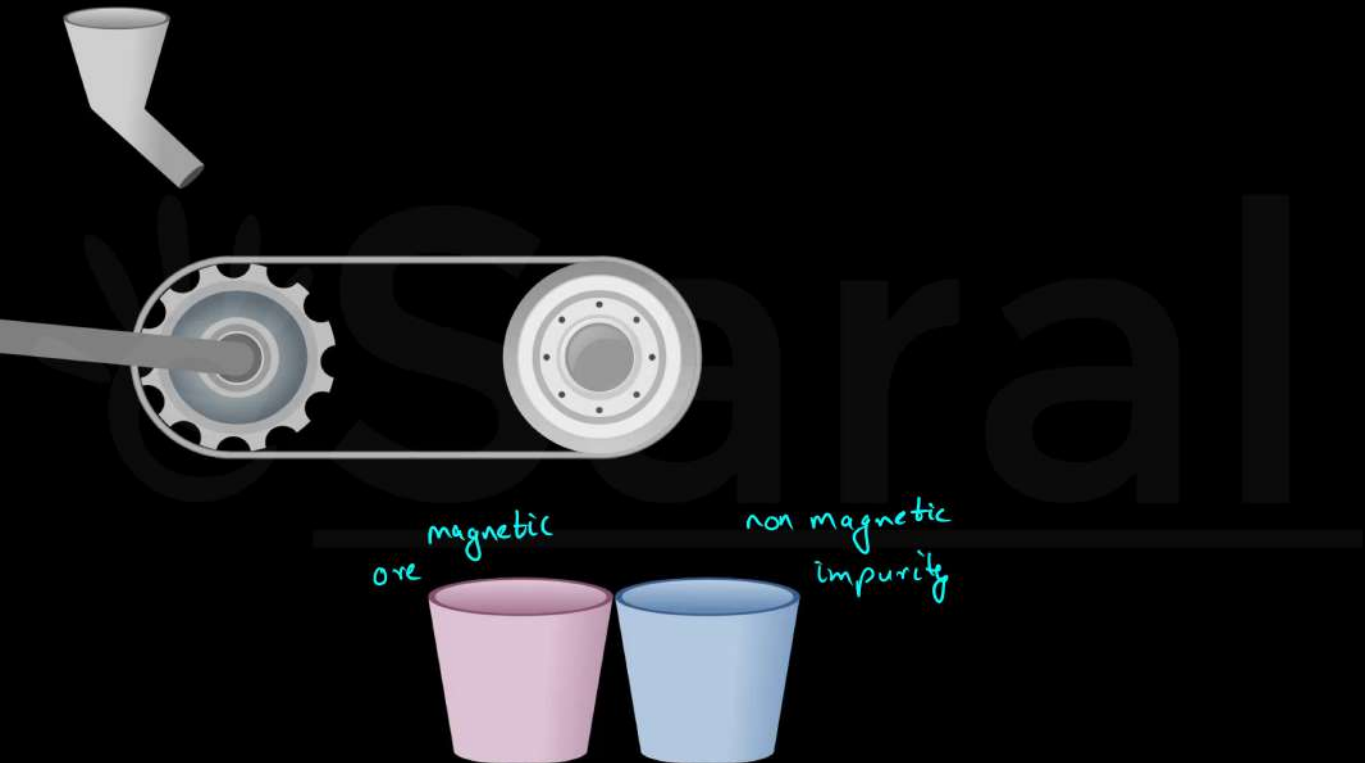
Magnetic Separation

Ore
Magnetic

Gangue
Non-magnetic

It is based on differences in magnetic properties of the ore components.

It is used when either the ore or the impurities associated with it are magnetic in nature.



Get Top Ranks in IIT-JEE/NEET with eSaraI APP



Get it on
Google Play

Example

Chromite ore ($\text{FeO} \cdot \text{Cr}_2\text{O}_3$) is separated from non-magnetic silicious impurities and cassiterite ore (SnO_2) is separated from magnetic Wolframite ($\text{FeWO}_4 + \text{MnWO}_4$) impurities.

1100 years

Froth Flotation Process

Sulphide ores

Tricky

X

Danger

This method is commonly used for the concentration of the low grade sulphide ores like galena, PbS (ore of Pb) ; copper pyrites $\text{Cu}_2\text{S} \cdot \text{Fe}_2\text{S}_3$ or CuFeS_2 (ore of copper) ; Zinc Blende, ZnS (ore of zinc) etc.,

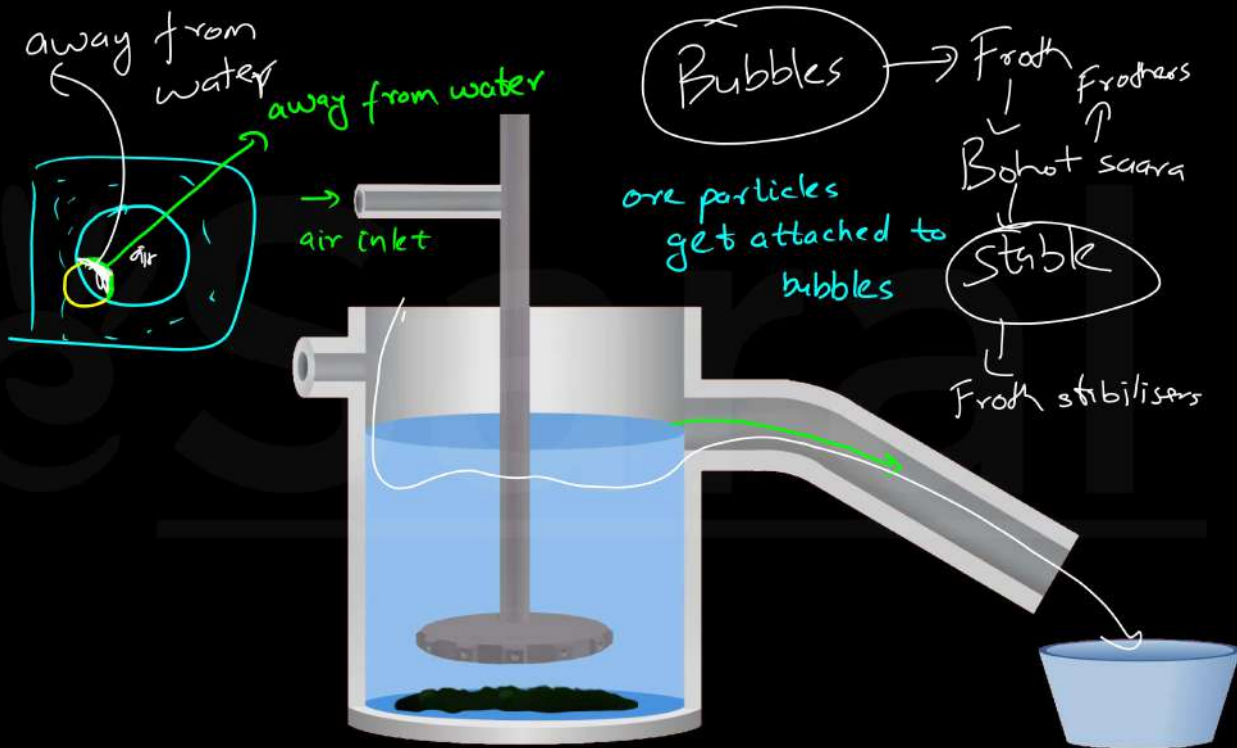
Learn

It is based on the fact that gangue and ore particles have different degree of wettability with water and oil.

The gangue particles are preferentially wetted by water while the ore particles are wetted by oil.

In this process one or more chemical frothing agents are added.





Frothers

These form stable froth which rises to the top of the flotation cell. Oil like pine oil, camphor oil etc., are used as Frothers.

These are added in small quantity.

Froth Stabilizer (Aniline & Cresol)

The stabiliser are added to the frothers so that the froth can be stable for longer period.

Collectors

Ore \Rightarrow water-repellant

Potassium or sodium ethyl xanthate is used as a Collector.

These get attached with the particles of the sulphide ore and thus make them water-repellent .

Consequently the ore particles pass on into the froth.
Collectors are always added in small quantity.

Activating and Depressing agents

Sulphide ore
Gmp → Sulphide

When a mineral contains other minerals as impurities.

The addition of these agents activates or depresses the flotation property of other minerals present as impurities and thus helps in separating the impurities.

For example galena (PbS) usually contains the minerals namely Zinc Blende (ZnS). → NaCN

Flotation is carried out by using potassium ethyl xanthate (used as a collector) along with NaCN (used as depressing agent).

The addition of NaCN depresses the flotation property of ZnS, so mainly PbS passes into the froth when air is blown in.

~~ZnS~~

ZnS → mehengga

| ke \$ bath | free

After **PbS** has been collected with the froth, the process is repeated by adding **CuSO₄ (activator)** which activates the flotation property of **ZnS** grains which are now removed with the froth.

By Chemical Separation Method

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play



Leaching

It involves the treatment of the ore with a suitable reagent.

e.g, acids, bases and suitable chemical reagents.



As to make it soluble while
impurity remain insoluble.

The ore is recovered from the
solution by suitable chemical
method.

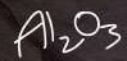
Get Top Ranks in IIT-JEE/NEET with eSara! APP



Get it on
Google Play

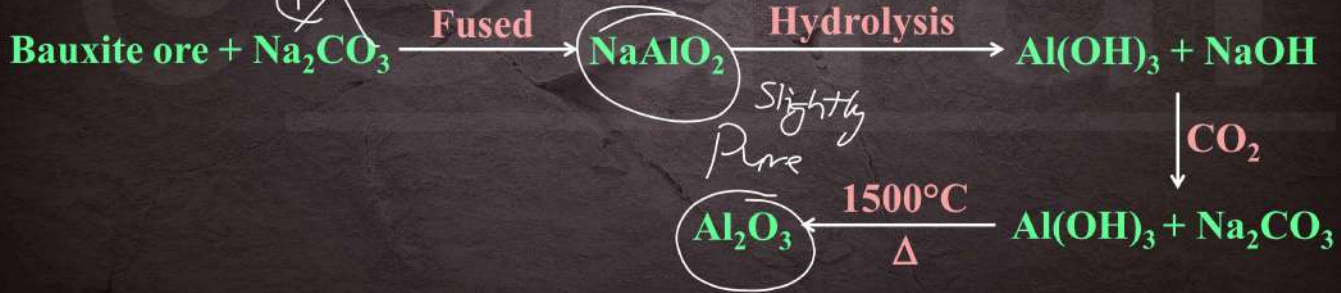


Hall's Process



Used for red bauxite

Gangue
↓
X



Cyanide Process

Imp Ag, Au Metallurgy

Ag → Cyanide is imp

Presence of air
yield

(a) Formation of cyanide complex

Le Chatelier



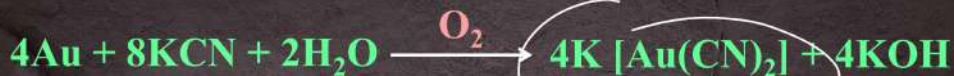
In absence of air reaction is reversible.



In presence of air reaction is irreversible.

(b) Au

Cyanide Process



Ore \rightarrow Separation \rightarrow Oxide

Oxygen \rightarrow calcination

X Oxygen \rightarrow roasting

Conversion of concentrated ore into oxide form

Roasting

Oxide

Sintering
Fusion

Roasting is a process in which the concentrated sulphide ore is heated in reverberatory furnace, below its melting point or fusion temperature in the presence of an excess of air to form metal oxide.

- ① Surface area
- ② Convenient

Calcination

Calcination is a process in which ore is heated, generally in the **absence of air**, to expel water from a hydrated or hydroxide ore and carbon dioxide from a **carbonate ore** at temperature below their melting points to form metal oxide.

R

- (i) Excess of sulphur is removed as volatile oxide.



L

- (i) Moisture is removed. H_2O
- (ii) Organic matter is destroyed
- (iii) The hydroxide and carbonate ores are converted into their oxides.

Roasting

- (ii) The metal sulphide is converted into metal oxide or sulphate.
- (iii) Impurities of Arsenic, Antimony & Phosphorous are removed as their volatile oxides.



Calcination

- (iv) The mass becomes porous and easily workable
- (v) Impurities like C, S, As, P etc. are removed by vaporisation.

M_2O

MF Technique

Reduction of ore to the metal

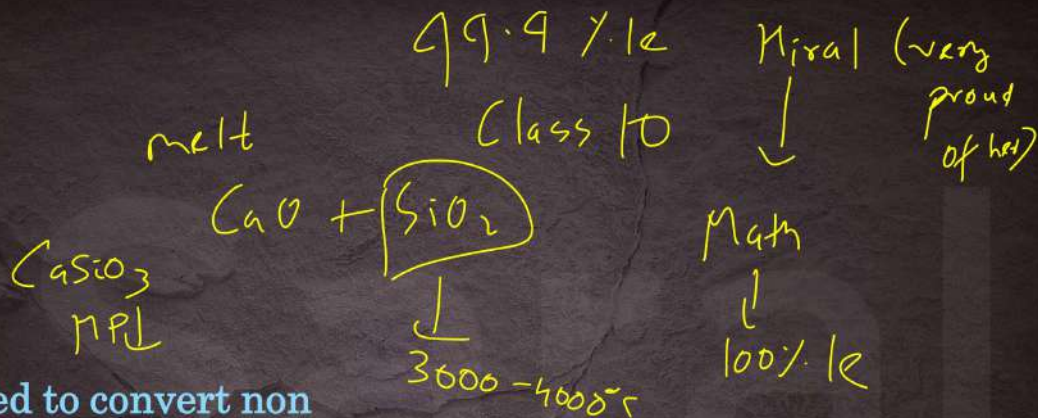


1.Reduction by Carbon (Smelting)

Some Reactions of Reduction By Carbon



Flux



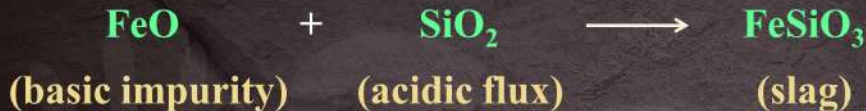
Substance used to convert non fusible impurities into fusible one.

Two types of Flux are used.



a) Acidic Flux

Substance used to remove basic impurities (metal oxide)



Acidic flux are non metal oxide (SiO₂, P₂O₅ etc.)

b) Basic Flux

Substance used to remove acidic impurities (non metal oxide).



Acidic flux are non metal oxide (SiO₂, P₂O₅ etc.)

2. Reduction by CO
Will cover with Iron

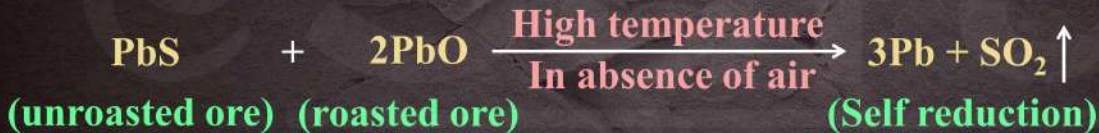
Get Top Ranks in IIT-JEE/NEET with eSaral APP



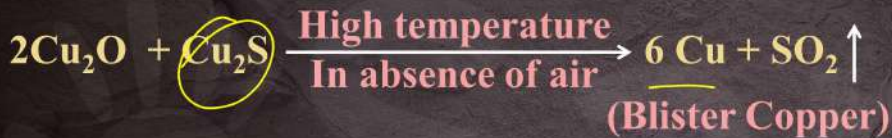
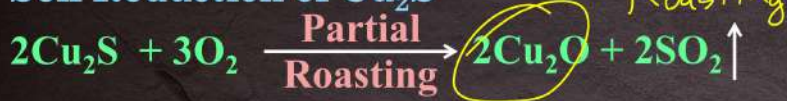
Get it on
Google Play

3.) Self reduction (Auto reduction)

Compounds of certain metals are reduced to metal without using any additional reducing agent, ores of **Cu, Pb, Hg** etc.



Self Reduction of Cu_2S



4.Reduction by metal(Alumino Thermite Process)

Oxygen affinity (dhansu)

In this process those metal oxide will be reduced which require high temperature and at high temperature carbon reacts with metal to form metal carbide.

heat release

↓
metals are melted

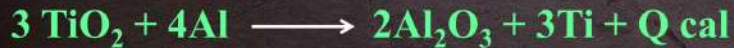
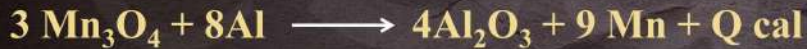


For Cr, Mn, Fe, Ti



molten





Get Top Ranks in IIT-JEE/NEET with eSara! APP

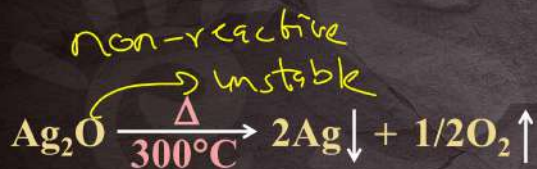


Get it on
Google Play

Kroll's process



5.) Thermal decomposition



6.) Electrolytic Reduction

This process is mainly used for the extraction of highly electropositive metals.

Na, K, Mg, Ca, Al, etc.

e.g. Manufacture of metallic sodium (Down's process)

Current
Electricity

2000°C

Electrolysis is carried out in large cells and a small amount of another suitable electrolyte is added.



- (i) Lowers the melting point of the main electrolyte
- (ii) Enhances its conductivity
- (iii) Reduces corrosion troubles



Molten NaCl containing a little CaCl_2 is electrolyzed between graphite anode and iron cathode.

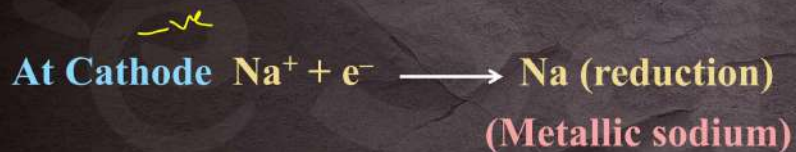
Learn

Get Top Ranks in IIT-JEE/NEET with eSaral APP



Get it on
Google Play

On Electrolysis



By Hydrometallurgy

Cyanide Process

7.) Metal displacement method

Silver and gold are extracted by a method involving complex formation.



Refining of Metals

Poling Process

This process is used for the purification of copper and tin.

(A) Purification of Impure Copper

Impure copper is remelted in a reverberatory furnace lined with SiO_2 and a blast of O_2 is blown into the furnace.

90% pure

40 mins