

METALS & NON-METALS.

Physical Properties

metals and	Non metals.
i] malleable [can be beaten into thin sheets]	i] non malleable [cannot be beaten into thin sheets]
ii] ductility [can be drawn into wires]	ii] non-ductile [cannot be drawn into wires.]
iii] are good conductors of electricity and heat	iii] are bad conductors of electricity and heat
iv] are lustrous	iv] non-lustrous.
v] have high melting & boiling pt.	v] Have low melting and boiling pt.

EXCEPTION:

- i] Mercury exist in solid form at room temp.
- ii] Gallium & caesium are metals with low melting pt.
- iii] allotropes of carbon conduct electricity (graphite)
- iv] Diamond a non metal is the hardest substance known.
- v] Lithium, sodium and potassium [Alkali metals] are soft, have low density and melting point.
- vi] Bromine - liquid
- vii] Iodine - non metal but lustrous.

IMP:

- i] Gold is the most ductile metal
- ii] Lead and mercury are poor conductors of heat
- iii] Polyvinylchloride [PVC] is a rubber-like material which is an insulator.

Roasting

- presence of excess of O_2
- mainly done on sulphide ores
- Releases toxic gas

Calcination

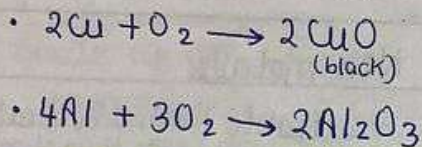
- presence of limited O_2 .
- mainly done on carbonate ores.
- Releases volatile compound.

• Smelting: heating ores beyond its melting point to obtain its metal.

Chemical properties

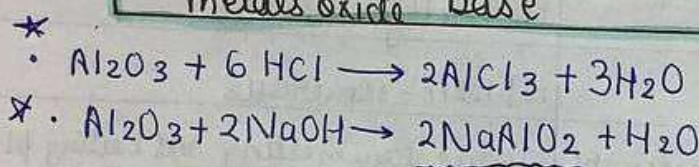
metals + oxygen :

metals + oxygen \rightarrow metal oxides.



amphoteric oxides :

amphoteric metals oxide + acid or base \rightarrow salt + H_2O .

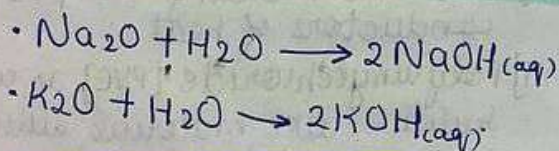


[metal oxides are insoluble in water]

metal oxides :

metal oxides + water \rightarrow metal hydroxides.

only water soluble metals form OH^- .

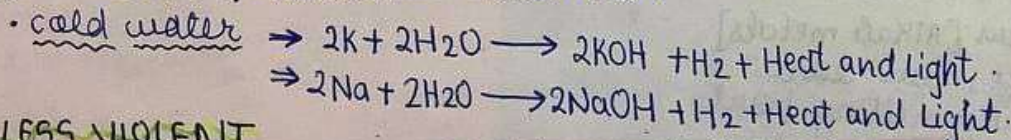


\Rightarrow reactivity series

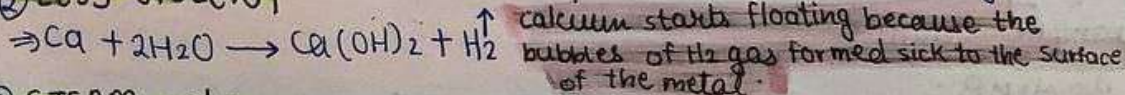
* metal + H_2O

metal + water \rightarrow metal oxide + $\text{H}_2 \uparrow$

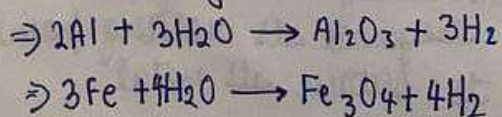
* ① VIOLENT & HIGHLY EXOTHERMIC.



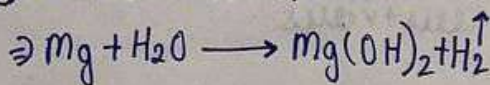
② LESS VIOLENT



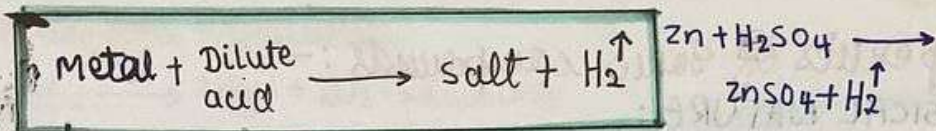
③ STEAM only



④ GIARAM PAANI

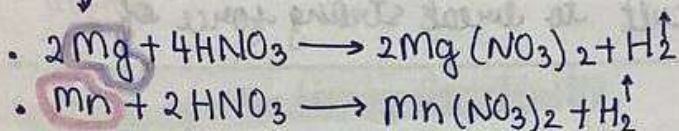


Na
Ca
Mg
Al
Zn
Fe
Pb
H
Cu
Hg
Ag
Pd
Au
Pt



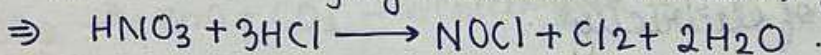
- Q. Why HNO_3 does not give H_2 gas ~~was~~ when reacts with metal.
 A. because it is a strong oxidizing agent.

↓ Exception



AQUA REGIA :-

- royal water • highly corrosive • dissolves gold & Platinum



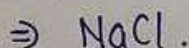
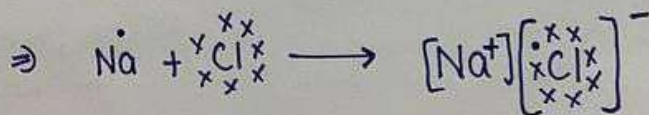
- Q. Al is a highly reactive but still is used in making numerous utensils. Why?

→ Al reacts with O_2 to form Al_2O_3 . It forms a layer of aluminum oxide which protects it from corrosion.

HOW DO METALS REACT WITH NON METALS?

→ covalent bond.

× Formation of sodium chloride.



*** Properties of Ionic compounds :-**

i] PHYSICAL NATURE :

- solid → because of strong force of attraction.
- brittle → broken into pieces when pressure is applied.

ii] melting and Boiling Point:

- high mp and BP → difficult to break strong force of attraction.

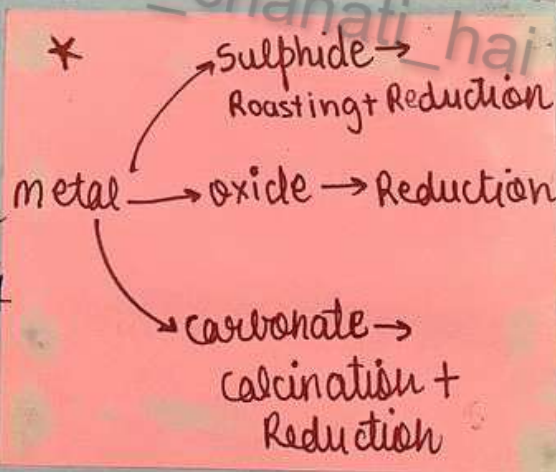
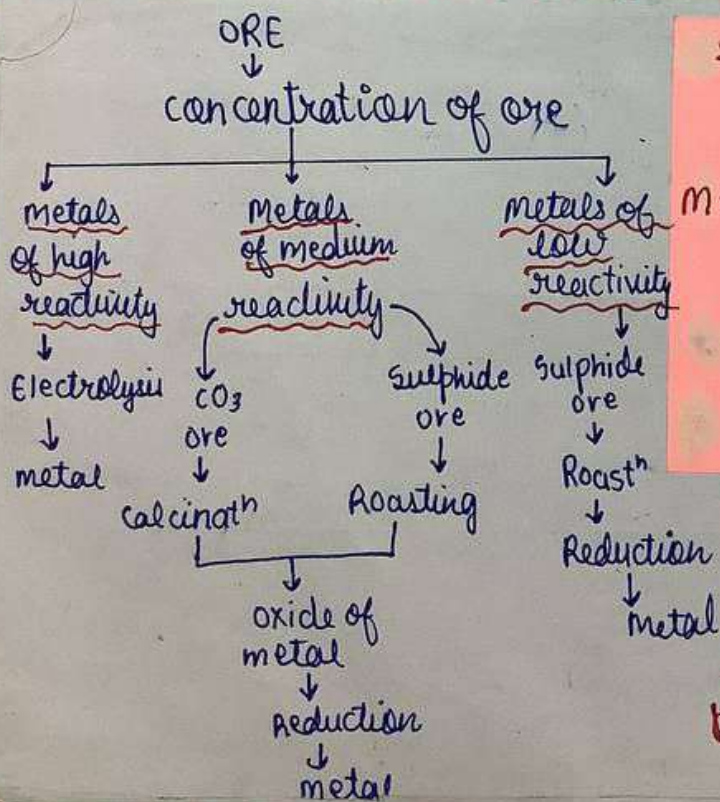
iii] SOLUBILITY:

- soluble in water → insoluble in kerosene, petrol.

iv] Conduction of electricity :

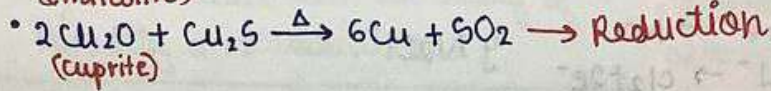
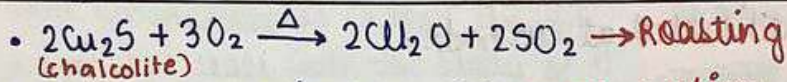
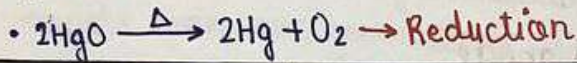
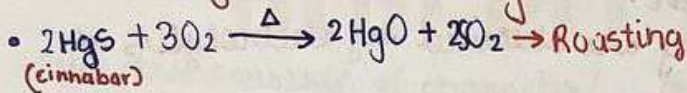
- does not conduct electricity
- Ionic compound in the solid form do not conduct electricity because of movement of ions is not possible.
- ∴ molten or liquid ✓

OCCURRENCE OF METALS

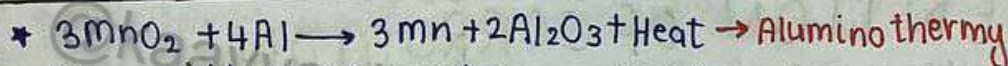
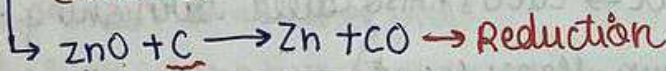
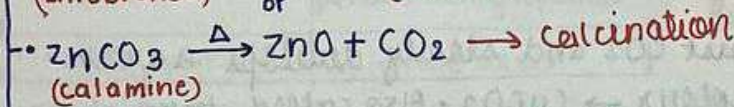
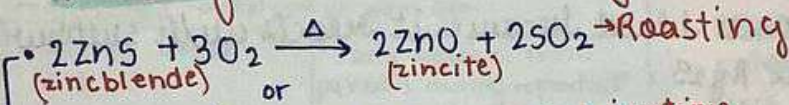


*** The principal of concentration of ore is difference between physical & chemical properties of elements & gaseous particles.**

Metals of Low Reactivity.



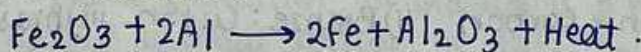
Metals of Medium Reactivity.



These displacement reactions are highly exothermic ∴ metals produced are in molten state.

• To join railway tracks:

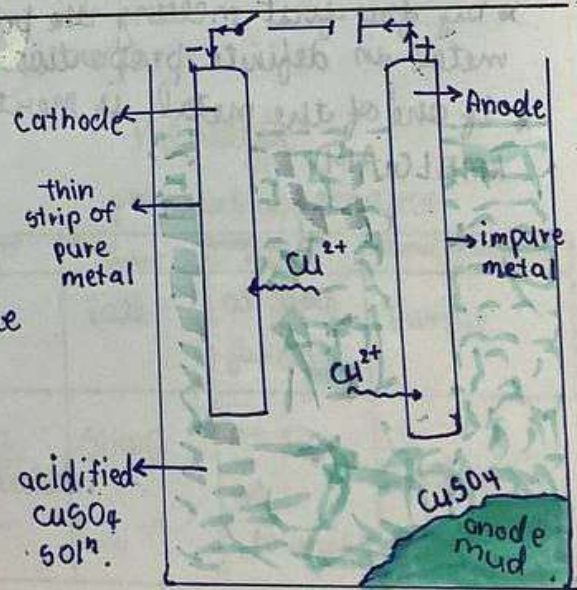
thermit reaction:—



Metals of high reactivity.

• Electrolytic Refining:
chemical process that uses electricity to reduce a substance to its ionic state.

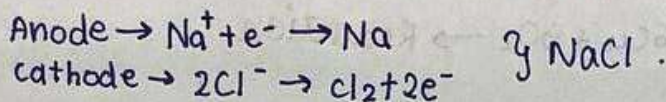
→ The soluble impurities go into the solution whereas the insoluble impurities settle at the bottom of anode, known as anode mud.



Electrolytic reduction:

metals of high reactivity are obtained by electrolysis of the molten chloride.

- The metals are deposited at anode
- The chlorine is liberated at cathode.



CORROSION

- Silver articles become black because it reacts with sulphur in the air to form Ag_2S .
- Copper reacts with moist CO_2 and slowly develops a green colour coating. Green colour $\rightarrow \text{CuCO}_3$. Also called tarnishing.
- Iron + air + moist \rightarrow brown flakes (rust).

PREVENTION OF CORROSION:

- Galvanisation: applying layer of Zn to steel or iron to prevent rusting.
 - Chrome plating: electroplating thin layer of Chromium.
 - Greasing: lubricating.
 - Alloying: i) steel - iron + carbon ii) Bronze: Cu + Sn iii) Brass: Cu + Zn
- * by first melting the primary metal then dissolving other metal in definite proportion.
- * If one of the metal is mercury, the alloy is known as AMALGAM.

metal

• The traits next generation • genes heredity

Acquired traits are inherited transmitted • acquired birth • learning

• genes • Allele partic

Dominant

* Homozygous

* Heterozygous if the

Trait
Dominant trait
Recessive trait