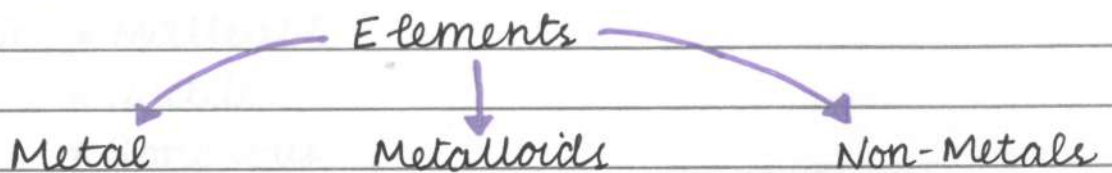


# METALS & N-M

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## ELEMENTS

- \* one of the types of pure substances
- \* 118 elements



## PHYSICAL PROPERTIES

### METAL

- |      |  |                                     |
|------|--|-------------------------------------|
| ☺ 1. | Gold<br>Silver                         | Ductile - drawn into thin wires     |
| ☺ 2. | Gold                                   | Malleable - beaten into thin sheets |
| ☺ 3. | Copper<br>Silver                       | Good Conductor of $\Delta$          |
| ☹ 4. | Lead<br>Mercury                        | Poor Conductor of $\Delta$          |
| ☹ 5. | Tungsten<br>Bismuth<br>Lead<br>Mercury | Poor Conductor of Electricity       |
| ☺ 6. | Silver<br>Copper                       | Good Conductor of Electricity       |

7. Lustrous
8. Sonorous
9. Solid at room temperature

## NON METAL found in $\left\{ \begin{array}{l} \text{carbohydrates} \\ \text{proteins} \end{array} \right.$

1. Gas / Solid at room temperature.
2. Bad Conductors
3. Not \* Malleable,
  - \* Ductile
  - \* Sonorous
  - \* Lustrous

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## EXCEPTIONS

### Metals

1. Mercury liquid at room temperature
2. Gallium, Cesium  $\downarrow$  M.P - melt in palm. 303K
3. Lithium, Sodium, Potassium -  $\downarrow$  MP,  $\downarrow$  densities  
[ALKALI] cut with knife

### Non-Metals

1. Iodine - lustrous
2. Carbon Allotropes
  - $\rightarrow$  Diamond - hardest,  $\uparrow$  MP &  $\uparrow$  BP
  - $\rightarrow$  Graphite - conducts electricity

good electrical

Pure M  $\rightarrow$  Alloys : (Mercury + X) = Alloy = AMALGAM

1. homogenous mixture of M + M / M + NM .....
2. steel  $\rightarrow$  iron 99.95%  $\rightarrow$  Nickel  
 $\rightarrow$  carbon 0.05%  $\rightarrow$  Chromium (OXIDE)
3. Bronze  $\rightarrow$  Copper (Cu) Brass  $\rightarrow$  (Cu)  
 $\rightarrow$  Tin (Sn)  $\rightarrow$  (Zn)
4. Solder  $\rightarrow$  Tin }  $\downarrow$  MP - fuse  
 $\rightarrow$  Lead }

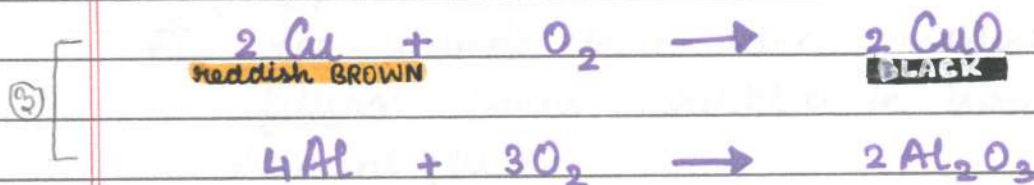
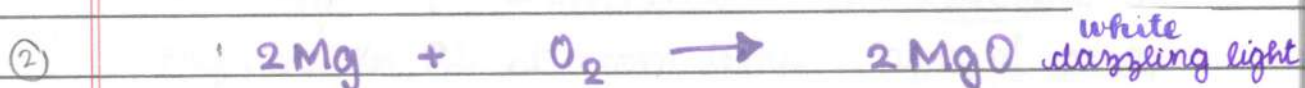
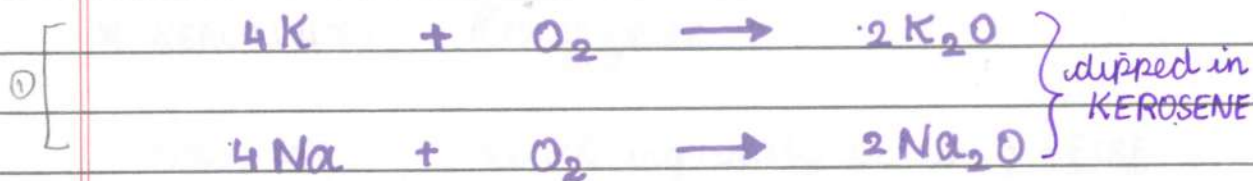
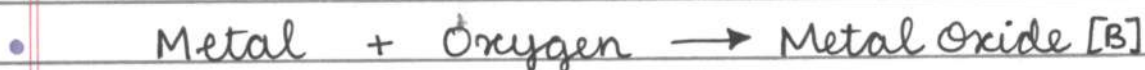


# CHEMICAL REACTIONS

## Metals

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### ► OXYGEN



## Amphoteric Oxides

reacts with  $\&$  behaves both as acid & base.

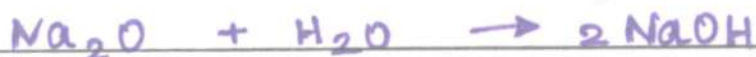
### $Al_2O_3$



### ZnO



**A** **Alkali** [Metal oxide that's soluble in  $H_2O$ ]  
Na, K, Li, Rubidium, Caesium, Francium

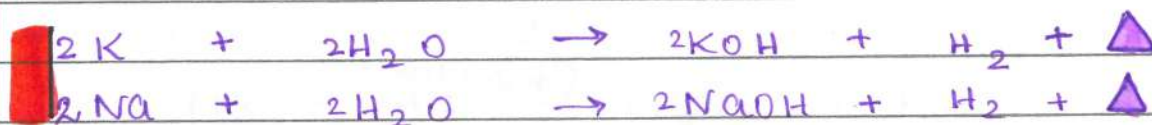
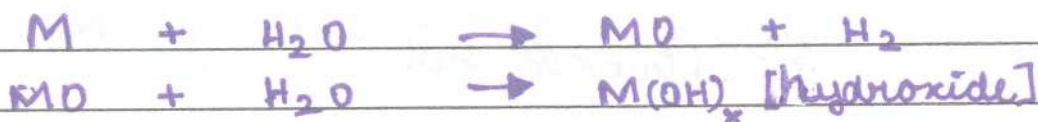


★ REACTIVITY · **Oxygen**

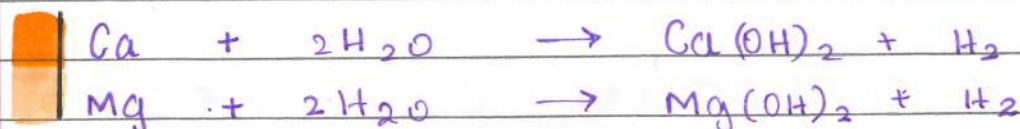
Na, K react vigorously in air & = FIRE  
 K, Na, Li ↑ reactive - in KEROSENE OIL  
 Mg, Al, Zn, Pb at room temp - layer of oxide  
 Au, Ag, Pt least reactive  
 Fe - rod doesn't burn - turns reddish  
 - fillings - burns - sprinkled in fire ↓ S.A  
 Cu - doesn't burn  
 - coated with black layer CuO

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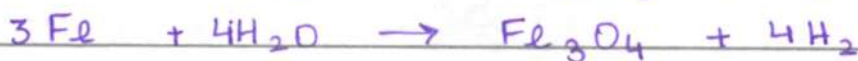
**A** **WATER**



react violently with cold  $H_2O$  - EXO -  $H_2$  catches fire







## REACTIVITY of Water

Na K	COLD	Hydrogen ↑ evolved catches FIRE.....
Ca		Ca/Mg floats in H <sub>2</sub> O. H <sub>2</sub> gets stuck to metal's surface
Mg	HOT	react ↓ violently
Al Fe Zn		
Cu Pb Au Ag	NO!	NO!!

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## METAL with ACID

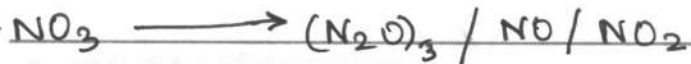




but . . . . .

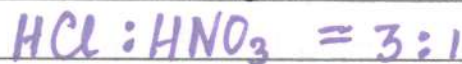


Nitric acid - strong oxidising agent



## Aqua Regia / Royal Water

freshly prepared mixture of concentrated



↑ly corrosive & fuming

↓  
dissolves gold & platinum

# Reactivity Series

K

order of intensity/reactivity  
of metal

Na

Ca

Mg

Al

Zn

Fe

Pb

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H

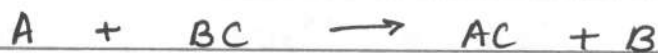
Cu

Hg

Ag

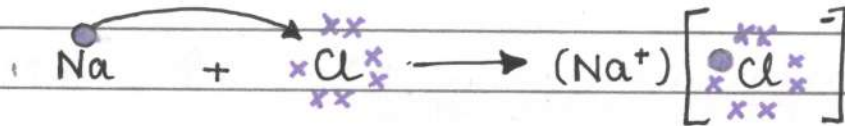
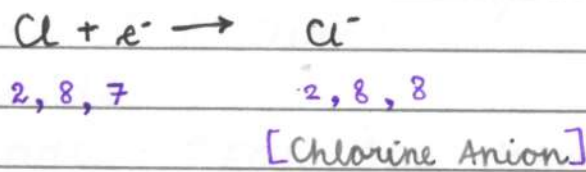
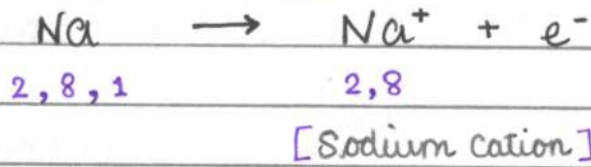
Au

→ Noble Metals

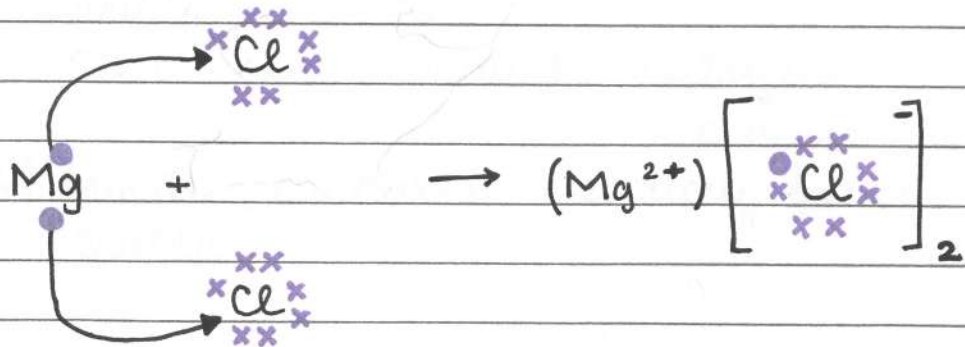
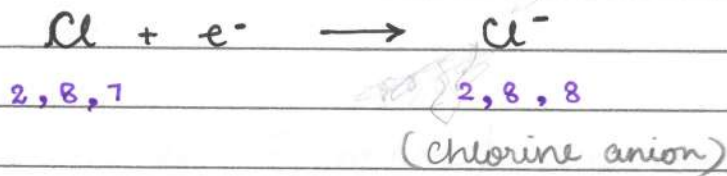
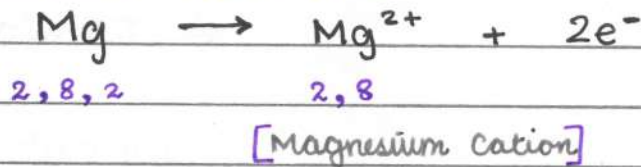




### Sodium chloride



### Magnesium chloride





## Sonic/Electrovalent

▷ Transfer of electrons from a metal to a non-metal  $M \xrightarrow{e^-} NM$

▷ PROPERTIES:

• Physical Nature:

→ solids

→ hard - ↑ F.O.A btw. (+)ve & (-)ve ions

→ pressure is applied - brittle, breaks

• ↑ M.P , ↑ B.P (↑ inter ionic attraction)

• Solubility: Electrovalent

→ water - soluble

→ solvents - kerosene, petrol - insoluble

• Conduction of Electricity:

→ conduction of electricity through a solution involves movement of charged particles

→ solution of ionic compound in  $H_2O$  contains IONS - moves to opposite electrodes when electricity is passed

→ !! SOLID - can't conduct electricity

rigid structure

!! MOLTEN & AQUEOUS conduct electricity - free ions