

Alloys

An alloy is a homogeneous mixture of two or more metals.

Properties of alloys:

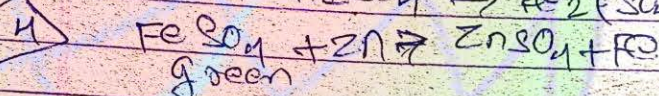
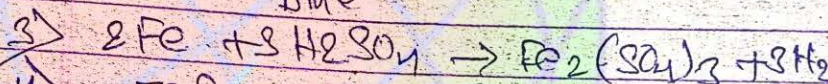
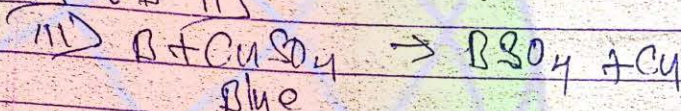
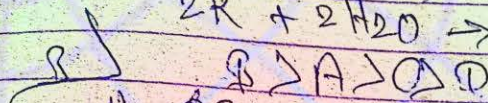
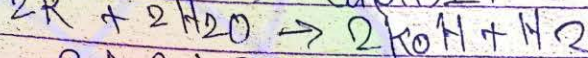
- I) It is stronger than metal.
- II) It is less corrosive, it has a lower melting point.
- III) It has low electrical conductivity.

Some common alloys of metals are following:

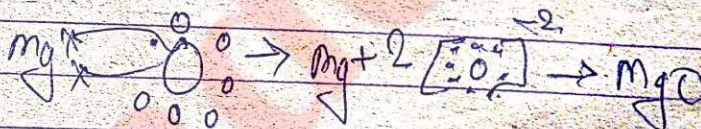
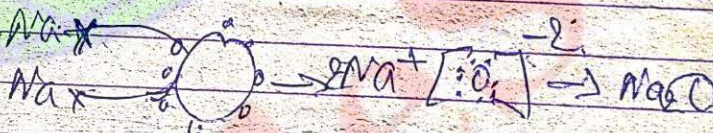
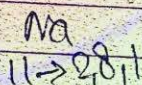
- I) Brass \rightarrow Cu + Zn \rightarrow screws, nut-bolt, wire etc.
- II) Bronze \rightarrow Cu + Sn (Copper + tin) Cooking, stamper, medals etc.
- III) Solder \rightarrow lead + tin (Pb + Sn) Welding
- IV) Amalgam \rightarrow ~~Cu~~ Ag + Sn + Hg + Ag + Sn + Zn
It is used for filling the teeth.

* Copper and silver is used in a gold to making the low carat of the gold.

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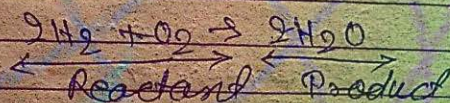


2) Highly electrostatic force.
An ionic compound is formed by the electrostatic force between the two atoms of elements. So more amount of energy is required to break this intermolecular force of attraction.

Chemical Reaction and equations. →

* What is chemical reaction?
Ans → when two or more substance reacts and forms new substance with new properties is called chemical reaction.

eg →



Hydrogen react with oxygen and form new substance water with new properties

→ There are two parts in a chemical reaction →

1. Reactants → The substance which take part in a chemical reaction are called reactant.

eg → $\text{H}_2 + \text{O}_2$, $2\text{Mg} + \text{O}_2$ etc.

2. Product → The new substance produced in a chemical reaction are called product.

eg → $2\text{H}_2\text{O}$, 2MgO etc.

Note → $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

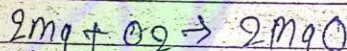
Hydrogen and oxygen are reactant and water (H_2O) is product.

Juste $MgCO_3$ → mixture of magnesium carbonate and magnesium hydroxide

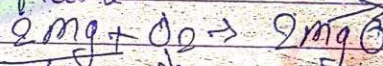
Q.111

Q → why should magnesium ribbon be cleaned before burning in air?

Ans → Before burning magnesium ribbon is clean by rubbing with a sand paper due to remove protective layer of magnesium carbonate ($MgCO_3$)



When magnesium ribbon is heated in the presence of oxygen it forms magnesium oxide with a dazzling white flame



magnesium oxygen white powder

* Some chemical reaction are: →

- (i) All burning
- (ii) Respiration process
- (iii) Digestion of food
- (iv) Curdling of milk
- (v) Rusting of iron
- (vi) Ripening of fruits.
- (vii)

* $MgCO_3$ (magnesium carbonate) is a mixture of magnesium carbonate and magnesium hydroxide

⇒ There are following characteristics of a chemical reaction which shows that chemical reaction is take place: ⇒

- (i) Evolution of gas ✓
- (ii) Formation of a precipitate. ✓
- (iii) change in colour ✓
- (iv) change in temperature and ✓
- (v) change in state (solid, liquid, gas)

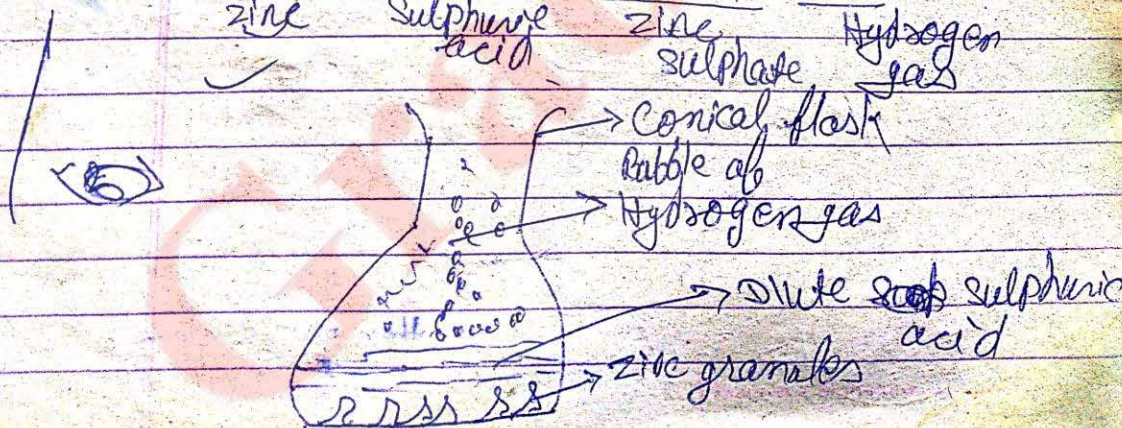
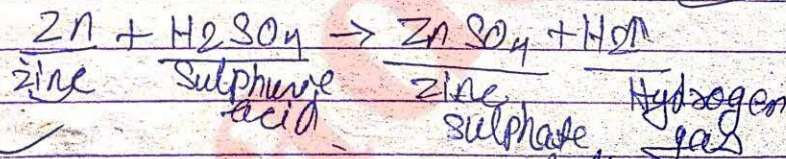
Evolution of gas

(a) Evolution of hydrogen gas: ⇒

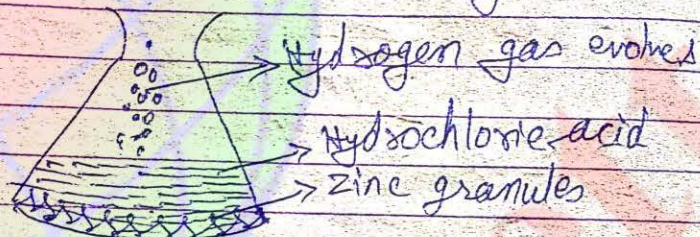
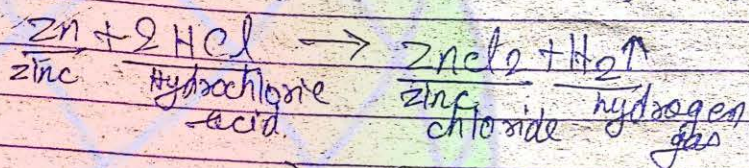
(c) sign of evolution of gas
 (d) गैस का उत्पन्न होना

Some chemical reaction are characterized by the evolution of a gas: ⇒
 example ⇒

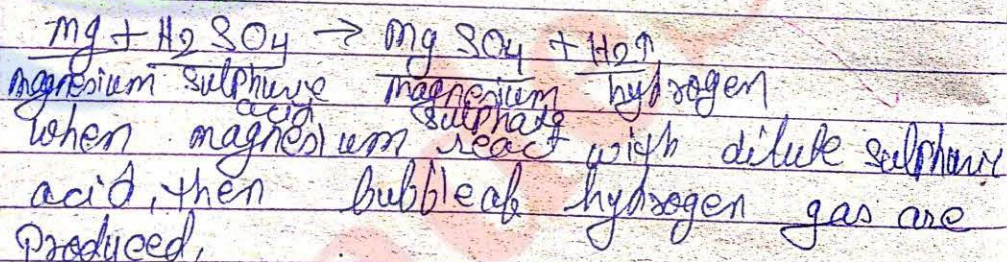
✓ When zinc granules react with dilute sulphuric acid, then bubble of hydrogen gas are produced.



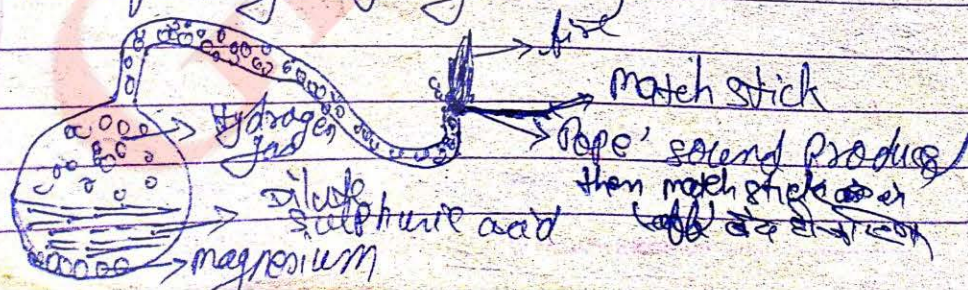
Q2) when zinc granules react with hydrochloric acid (HCl) then it forms hydrogen gas



Q3) ~~Q3~~ → Taste of hydrogen gas: →



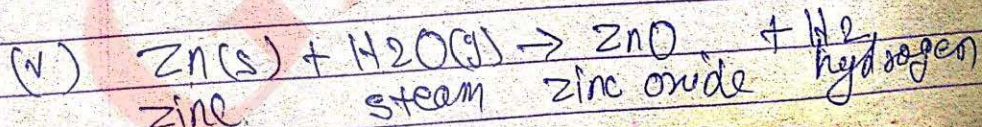
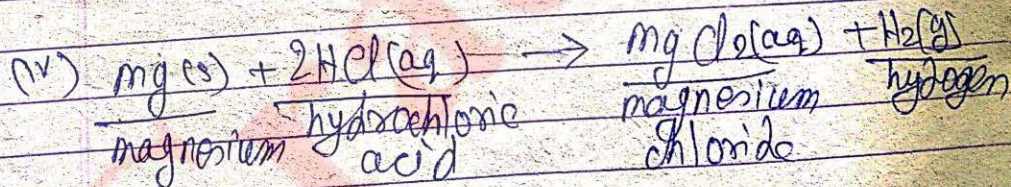
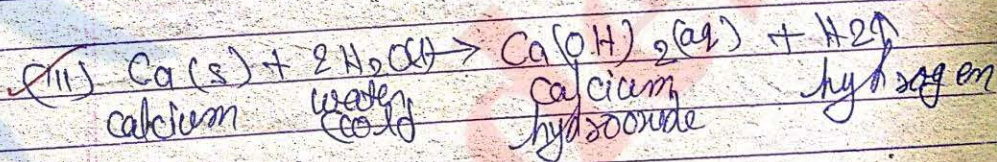
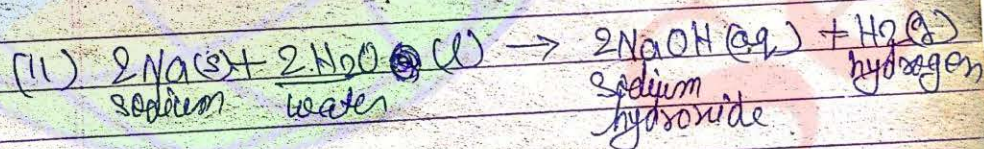
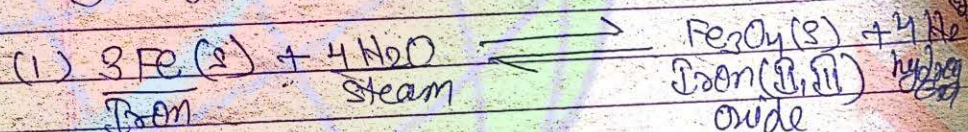
When hydrogen gas passes through fire then it produces 'pop' sound it is test of hydrogen gas (H₂)



(Carbon dioxide gas evolve)

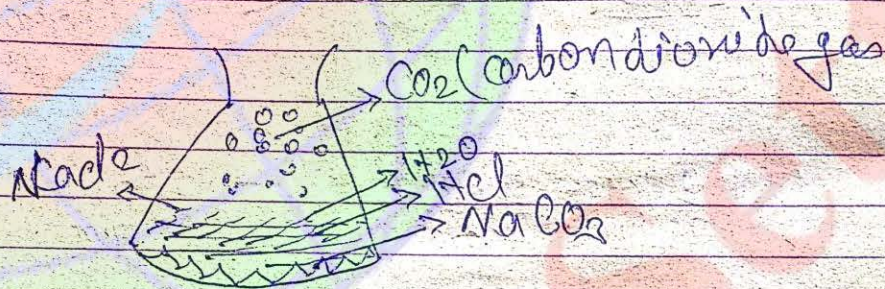
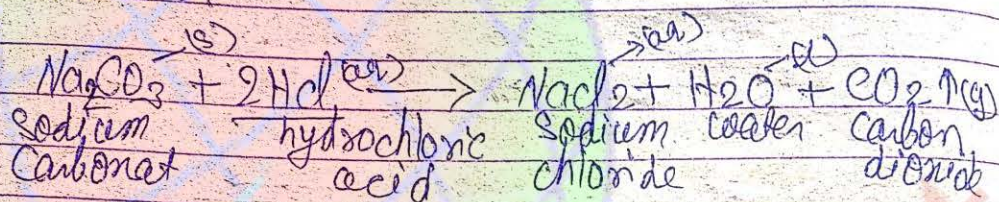
(1) when dilute hydrochloric acid is poured over sodium carbonate in a test tube then carbon dioxide gas is evolved.

Some other reaction in which hydrogen gas is evolved →

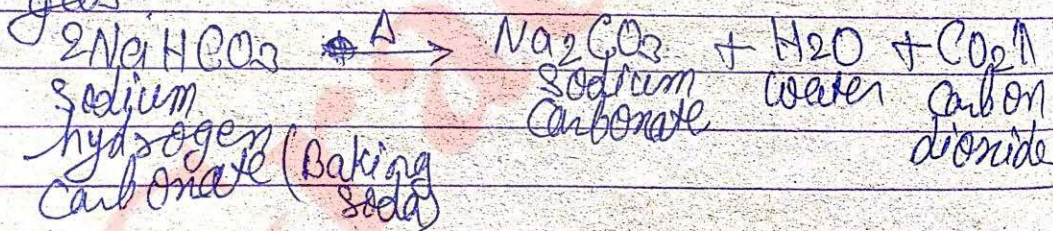


(b) Evolution of carbon dioxide gas →

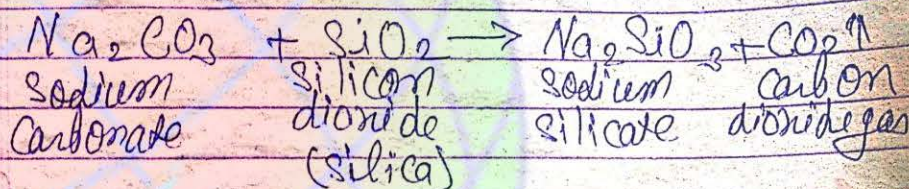
(i) When dilute hydrochloric acid is poured over sodium carbonate in a test tube then carbon-dioxide gas is evolved.



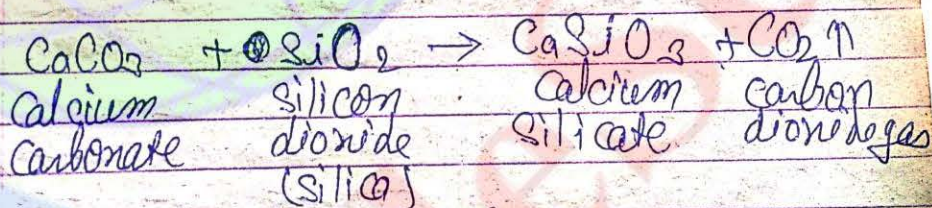
(ii) When sodium hydrogen carbonate (or its solution) is heated, then it decomposes to give sodium carbonate with the evolution of carbon dioxide gas.



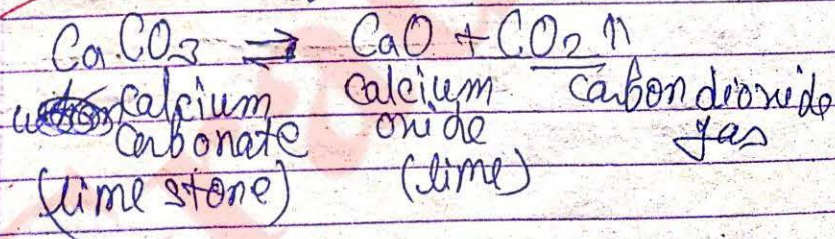
(iii) when sodium carbonate reacts with silicon dioxide then it form sodium silicate and carbon dioxide gas.



(iv) when calcium carbonate react with silicon dioxide then carbon dioxide gas is form.

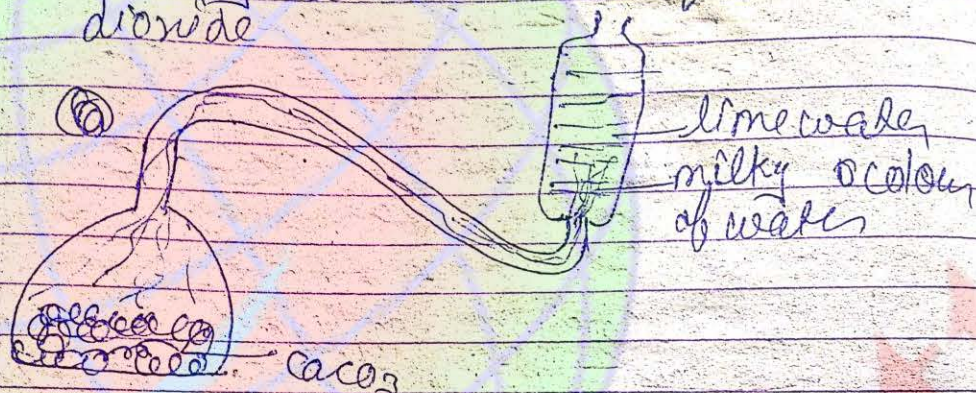


⊗ (v) Test of Carbon dioxide gas →



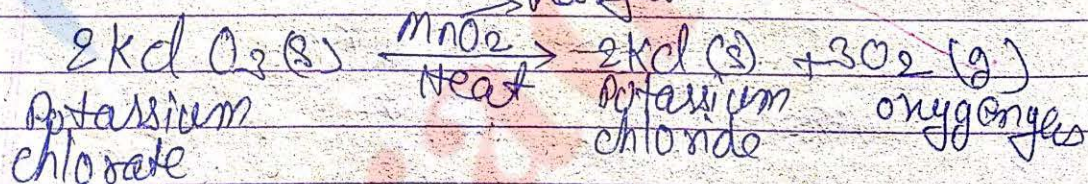
when CaCO_3 is divided into two part CO_2 and then carbon dioxide gas is

form and when CO_2 is passed through lime water then it turns lime water to milky it is the test of carbon dioxide



Some other chemical reaction in which gas is evolved \rightarrow

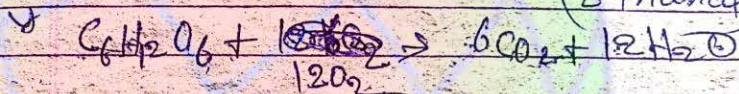
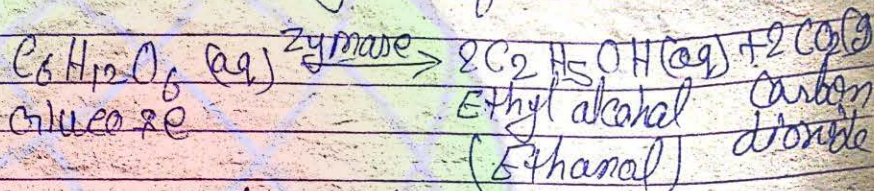
When potassium chlorate is heated in the presence of manganese dioxide catalyst then oxygen gas is formed



(ii) when Glucose is divided into two part then ethyl alcohol and

(Zymase?)

Carbon dioxide gas in form



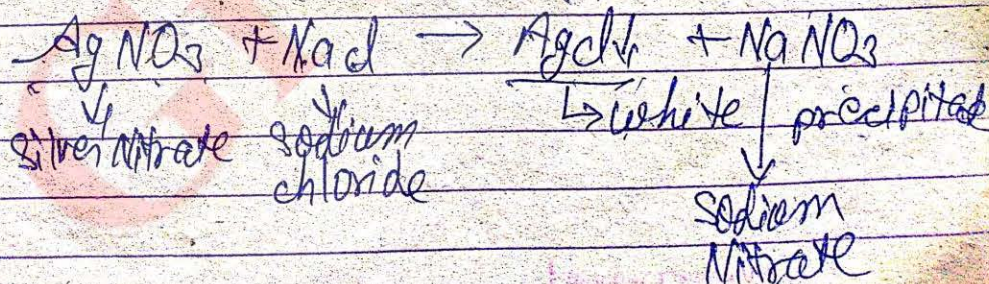
⇒ Formation of Precipitate ⇒ ↓ precipitate

A solid product which comes out from the solution during the chemical reaction is called precipitate.

Precipitate is insoluble in a water.

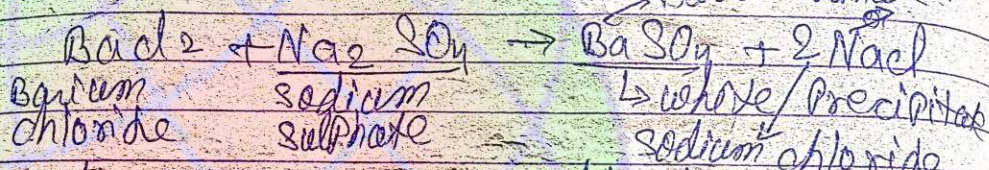
Formation of precipitate during the chemical reaction show that the

white precipitate chemical reaction is take place →
 (1) eg → when silver nitrate react with sodium chloride form white precipitate silver chloride

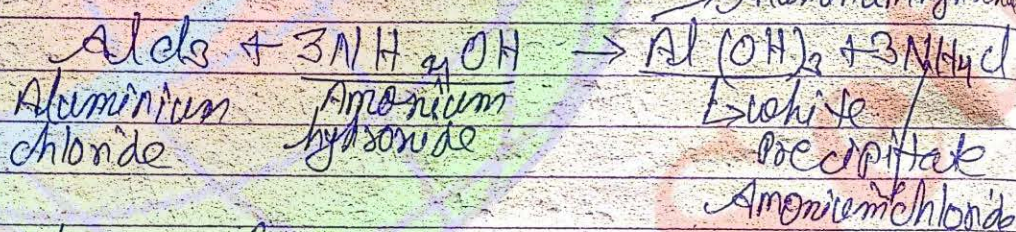


Precipitate → ppt

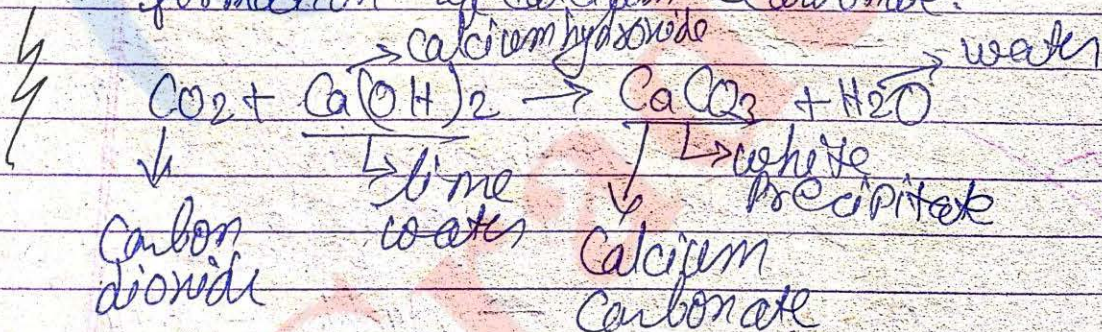
(iii) when Barium chloride react with sodium sulphate form white precipitate



(ii) when Ammonium chloride react with aluminium hydroxide form white precipitate



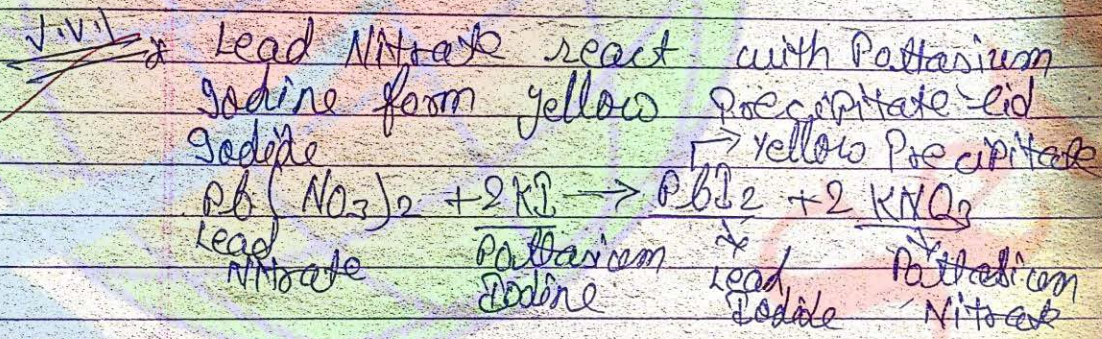
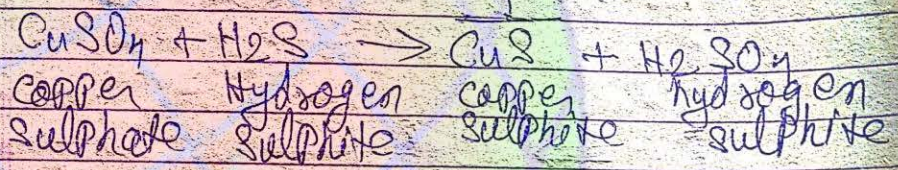
(iv) when carbon dioxide gas passes through the lime water it turns in milky due to formation of calcium carbonate.



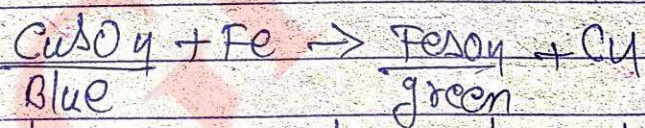
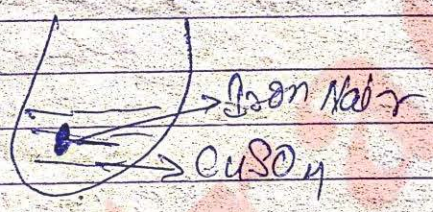
(v)

When copper sulphate react with hydrogen sulphide then Black precipitate
 Copper sulphate and hydrogen sulphate
 other precipitate form

✓ ✓
 (i) when copper sulphate react with hydrogen sulphide form Black precipitate
 copper sulphate → Black precipitate



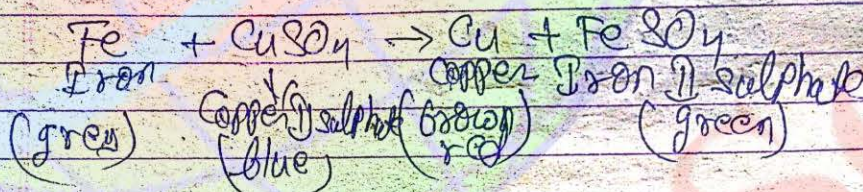
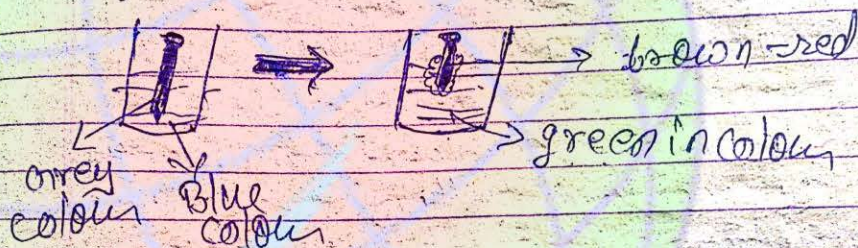
Change in Colour: →



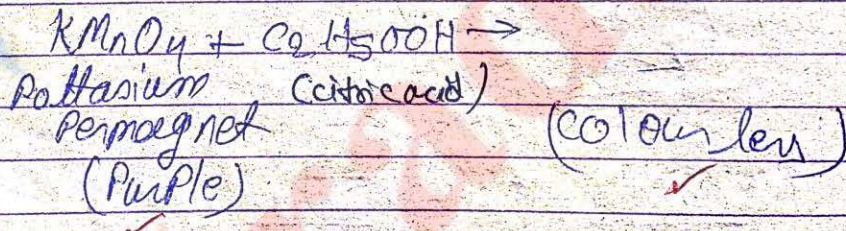
change in colour show that chemical reaction is take place.

example \rightarrow Test

When Iron nail dipping copper sulphate (blue in colour) after certain time its colour change into green due to formation of Iron sulphate ($FeSO_4$)



(ii) when dilute potassium permanganate react with citric acid which colour change from Purple to colourless.

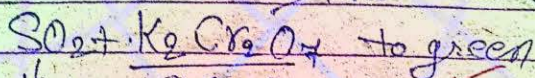


(iii) when sulphur dioxide react with potassium dichromate ($K_2Cr_2O_7$) change from orange

lemon juice - citric acid

to green

→ potassium dichromate



sulphur dioxide

orange

potassium dichromate solution

Ques) when calcium hydroxide react with carbon dioxide then its colour change colourless to white.

→ calcium hydroxide



colourless

carbon dioxide

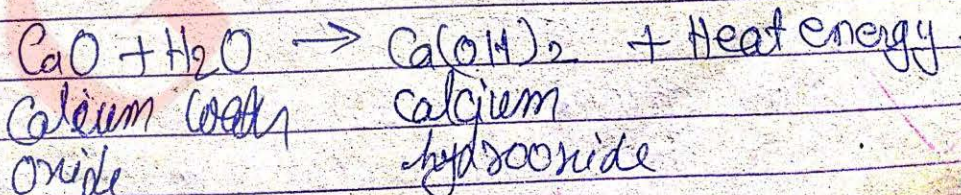
white

water

Change in temperature

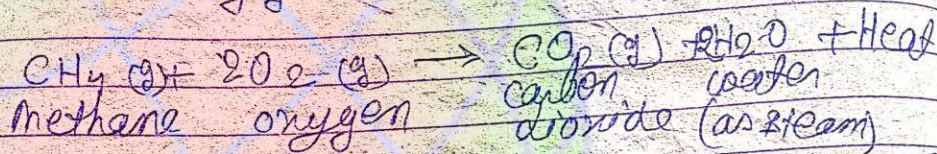
chemical change in temperature shows that chemical reaction is take place.

eg: 1) when quick lime (CaO) is added into water then heat energy is release.

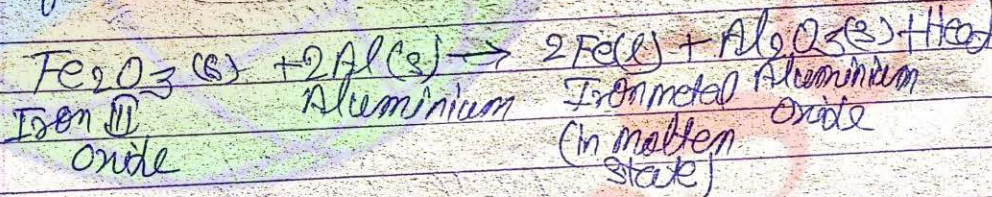


* Δ symbol of heat
 * molten state = liquid state

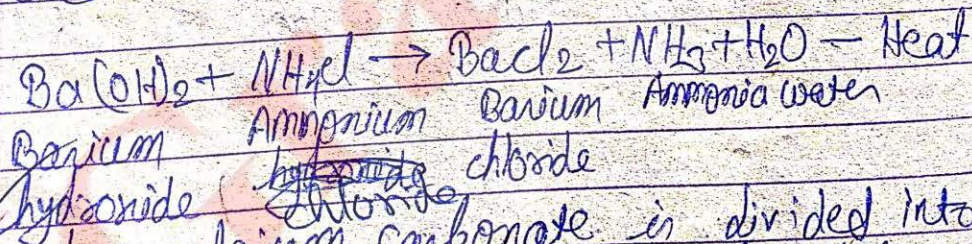
(ii) when methane burns in air (or undergoes combustion in air) a lot of heat energy is released.



(iii) when Aluminium powder reduced Iron(III) oxide to form iron metal and Aluminium oxide and an extremely large amount of heat is produced during this reaction.

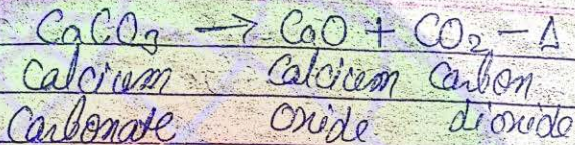


~~(iv)~~ when Barium hydroxide react with ammonium chloride forms Barium chloride ammonia and water. In this reaction temperature heat is absorbed.

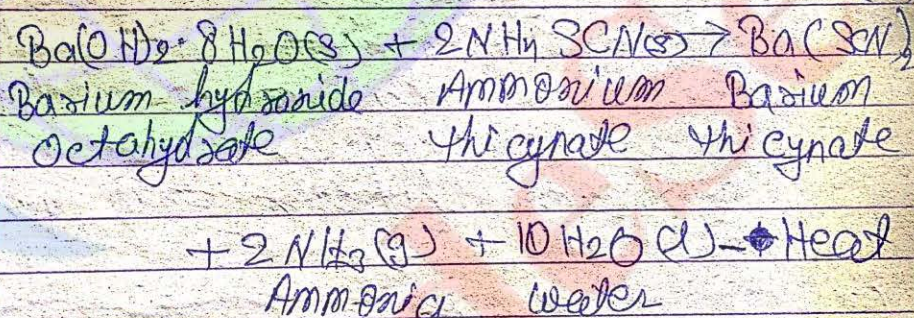


~~(v)~~ when calcium carbonate is divided into two parts then heat is absorbed

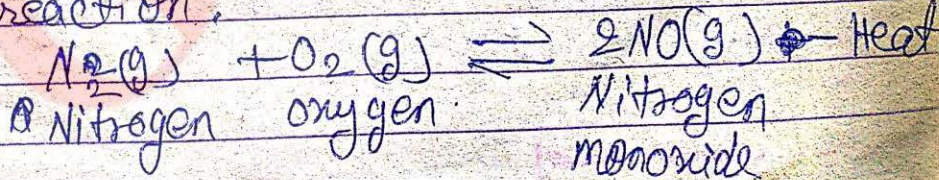
Release → ऊष्मा मुक्त, उत्पन्न → Endothermic reaction
 absorb → अवशोषण, ग्रहण → Endothermic reaction



(iii) when barium hydroxide octahydrate is added to ammonium thiocyanate then barium thiocyanate and ammonia are formed. A lot of heat energy is absorbed during this reaction due to which the reaction mixture very cold.



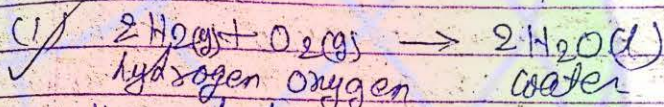
(iv) when Nitrogen and oxygen are heated to a very high temperature, they combine to form Nitrogen monoxide. A lot of heat energy is absorbed in this reaction.



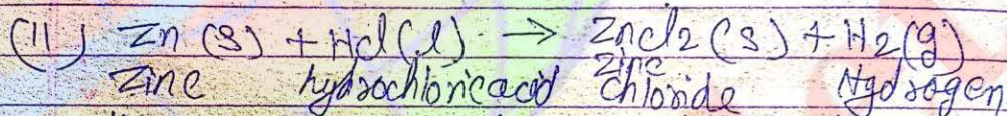
Change in State: →

change in state show that chemical reaction is take place.

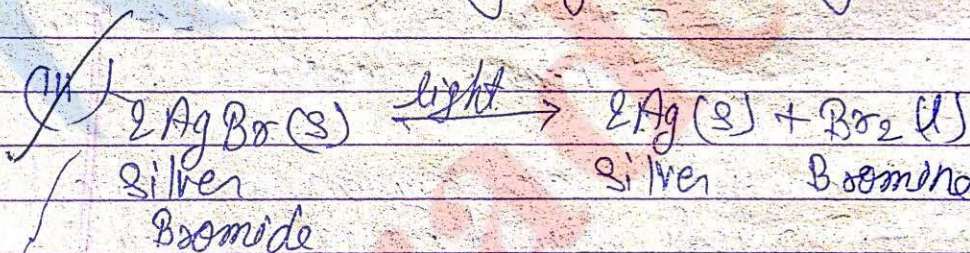
example: →



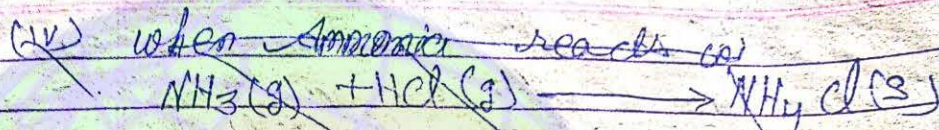
Here, hydrogen ($2H_2$) and oxygen (O_2) are in gaseous state, where water (H_2O) is in liquid state.



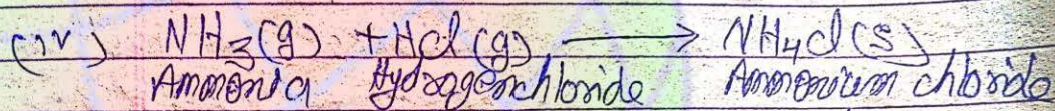
Here, zinc is in liquid solid state and hydrochloric acid is in liquid state where, zinc chloride ($ZnCl_2$) is in solid state and hydrogen is in gaseous state.



Here, silver bromide is in solid state where after reaction it changes ~~into~~ ~~gas~~ into solid state and Br_2 is in liquid state.



Here, Ammonia (NH_3) and hydrochloric acid is in gaseous hydrogen chloride

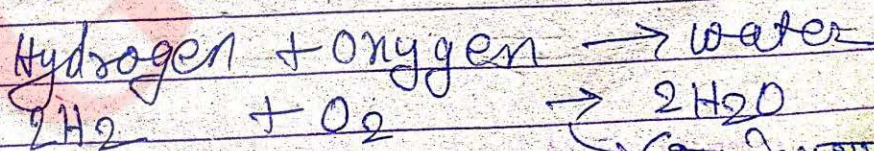


Here, Ammonia (NH_3) and hydrogen chloride is in gaseous state, where Ammonium chloride is in solid state.

Chemical equation: →

The symbolic representation of atoms of an element involve in a chemical reaction is called chemical equation.

when hydrogen react with oxygen to form water



→ (संयुक्त यौगिक का अणु संख्या)

Note →

The substances which combine or react are known as reactants. The reactants are always written on the left hand side in an equation with a plus sign (+) between them.

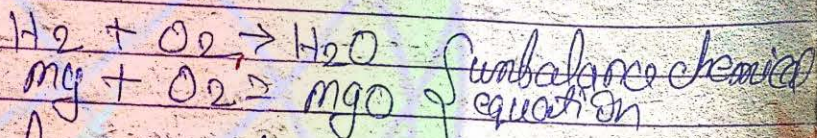
The new substance produced in a reaction are known as products. The products are always written on the right hand side in an equation with the plus sign (+) between them.

The arrow sign (\rightarrow) pointing towards the right hand side is put between the reactants and products. This arrow indicates that the substances written on the left hand side are combining to give the substance written on the right hand side in the equation. It should be clear by now that a chemical equation is a short-hand method of representing a chemical reaction.

⇒ Unbalance or skeletal chemical equation

A chemical equation in which no. of atoms of an element of the reactant are not same no. of atoms of element in product side is called an unbalance chemical equation.

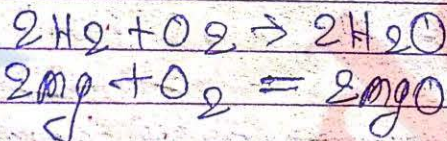
eg →



⇒ Balance chemical equation

A chemical equation in which no. of atoms of element of the reactant and product are same is called balance chemical equation.

eg →



* Necessity of balance the equation: ⇒

↳ To balance the chemical equation to follow the law of conservation of mass that is mass can not be created nor destroyed.

⇒ Balancing chemical equation: →

A chemical equation is
to write the balance chemical
equation they are following necessary
steps: →

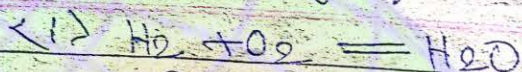
- (i) To write down chemical equation in form of words.
- (ii) To write the symbol and formula of reactant and product.
- (iii) Balance the equation by multiplying the symbol and formula by simplest numerical value.
- (iv) To write the state change of it to make more informative.

⇒ To make equation more Informative

To make the chemical equation more informative to indicate following

- (i) Physical state of reactant and product
- (ii) Heat change taking place in the reaction
- (iii) Condition under which reaction take place.

Balancing equation: \rightarrow (By hit and trial method)



LHS

$H = 2 \times 2 = 4$

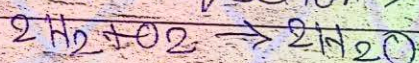
$O = 2$

RHS

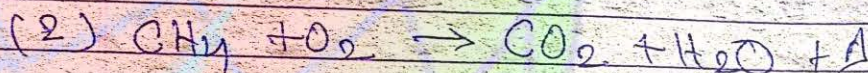
$H = 2 \times 2 = 4$

$O = 1 \times 2 = 2$

Balance equation \rightarrow



\rightarrow add coefficient
 श्री ब्रह्मर्षि



LHS

$C = 1$

$H = 4$

$O = 2 \times 2 = 4$

RHS

$C = 1$

$O = 2 + 1 \times 2 = 4$

$H = 2 \times 2 = 4$

Balance equation



LHS

$K = 2 \times 1 = 2$

$Cl = 2 \times 1 = 2$

$O = 3 \times 2 = 6$

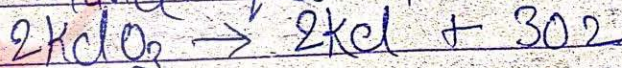
RHS

$K = 2 \times 1 = 2$

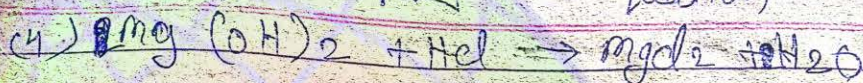
$Cl = 2 \times 1 = 2$

$O = 3 \times 2 = 6$

Balance equation

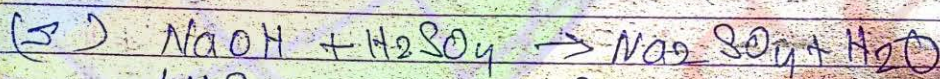
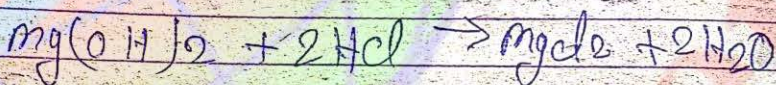


(Note) observe carefully this equation



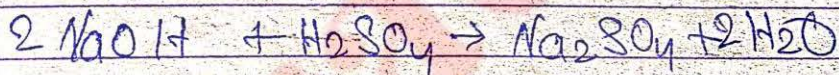
	LHS	RHS
Mg = 1	Mg = 1	Mg = 1
O = 2	O = 2	O = 2
H = 2 + 1 x 2 = 4	H = 2 x 2 = 4	H = 2 x 2 = 4
Cl = 1 x 2 = 2	Cl = 1 x 2 = 2	Cl = 1 x 2 = 2

Balance equation



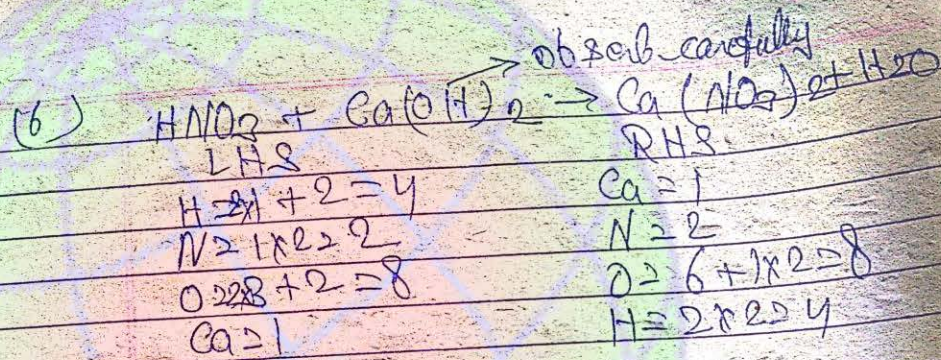
	LHS	RHS
Na = 1 x 2 = 2	Na = 2	Na = 2
O = 2 x 1 + 4 = 6	O = 4 + 1 x 2 = 6	O = 4 + 1 x 2 = 6
H = 2 x 1 + 2 = 4	H = 2 x 2 = 4	H = 2 x 2 = 4
S = 1	S = 1	S = 1

Balance equation

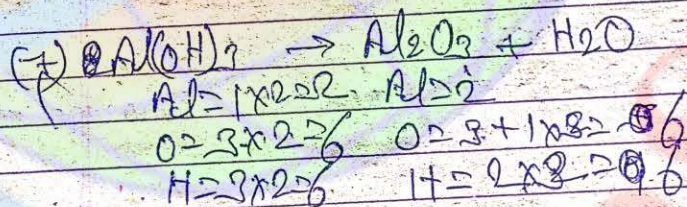
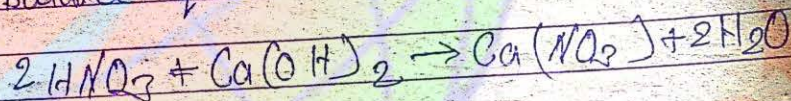


	LHS	RHS
P = 4	P = 2 x 2 = 4	P = 2 x 2 = 4
O = 2 x 5 = 10	O = 5 x 2 = 10	O = 5 x 2 = 10

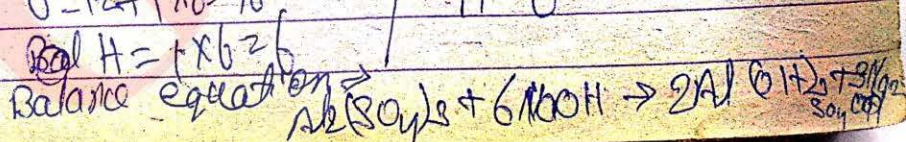
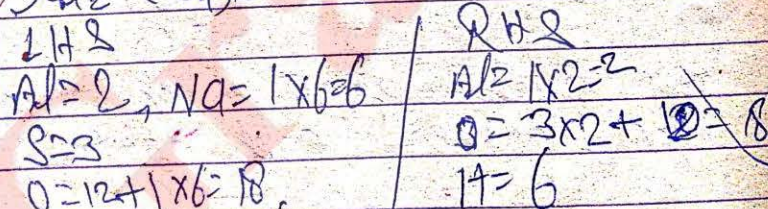
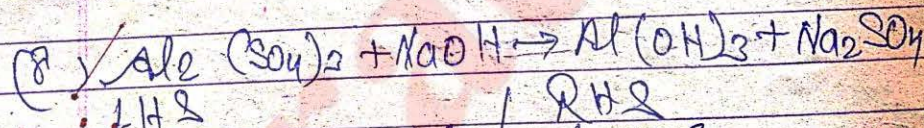
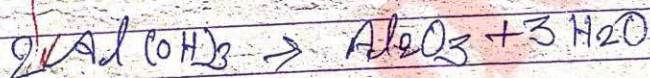
Balance equation $\rightarrow P_4 + 5O_2 \rightarrow 2P_2O_5$



Balance equation

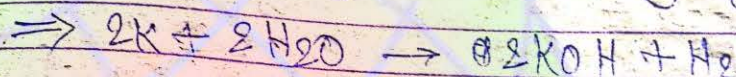


balance chemical equation

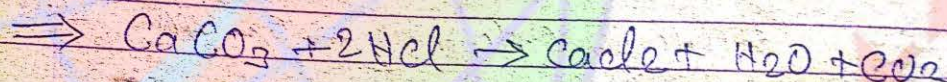


write the balance chemical equation: →

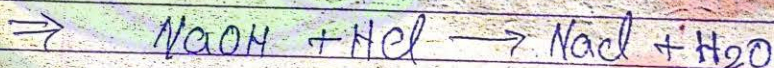
(1) Potassium react with water to form potassium hydroxide and hydrogen gas



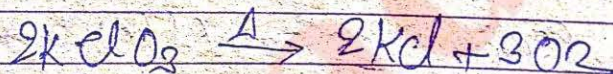
(2) Calcium carbonate react with hydrochloric acid to form calcium chloride, water and carbon dioxide



(3) Sodium hydroxide react with hydrochloric acid to form sodium chloride and water.



(4) Potassium chlorate on heating gives potassium chloride and oxygen.

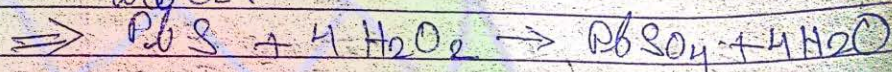


(5) Copper oxide react with hydrogen to form copper and water

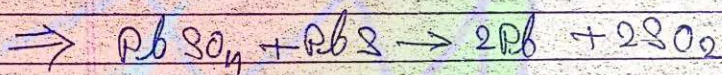


Hydrogen Peroxide $\rightarrow H_2O_2$

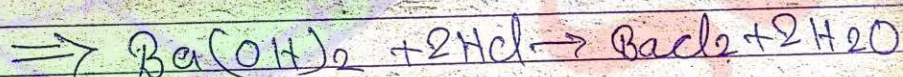
(6) ~~Lead~~ Lead sulphide react with hydrogen peroxide to form lead sulphate and water.



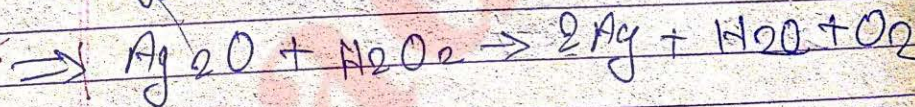
(7) Lead sulphate react with lead sulphide form lead and sulphur dioxide.



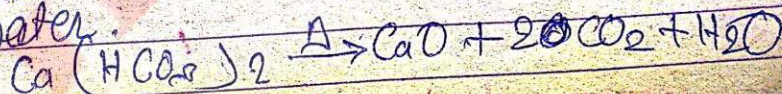
(8) Barium hydroxide react with hydrochloric acid to form barium chloride and water.



(9) Silver oxide react with hydrogen peroxide to form silver, water and oxygen.



(10) On heating calcium bicarbonate calcium oxide carbon dioxide and water.



How to make equation more informative

To make the equation more informative to indicate following \rightarrow

- i) Physical state of reactant and product.
- ii) Heat change.
- iii) Condition.

\Rightarrow Physical state \Rightarrow

Solid \Rightarrow (s)

Liquid \Rightarrow (l)

Gas \Rightarrow (g)

Aqueous (solution in water) \Rightarrow aq

Precipitation $\Rightarrow \downarrow$

Evolution of gas $\Rightarrow \uparrow$

aqueous form
Concentrated \Rightarrow Conc (10% water + 90% acid)
dilute \Rightarrow dil (10% acid + 90% water)

Note \Rightarrow Precipitate is written in short form as 'ppt'

precipitate → ↓

(1) To indicate the physical state of reactant and product in an equation

There can be four physical state for the reactant and product →

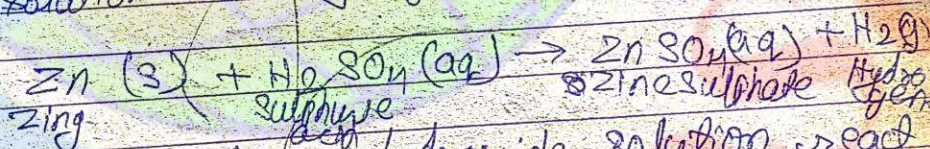
(i) solid state → (s)

(ii) liquid state → (l)

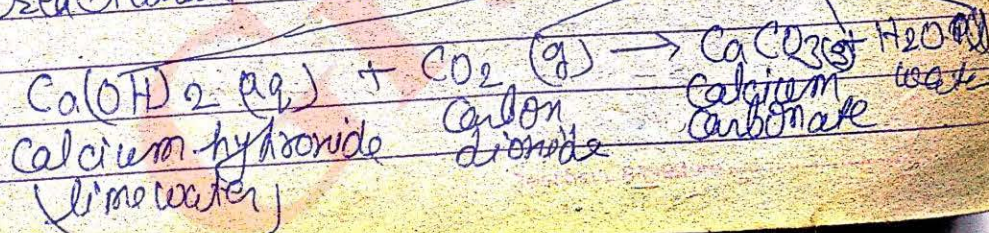
(iii) gaseous state → (g)

(iv) Aqueous state → (aq)

eg → Zinc metal react with dilute sulphuric acid to form zinc sulphate solution and hydrogen gas



(ii) when calcium hydroxide solution react with carbon dioxide gas, a white precipitate of calcium carbonate is formed along with water. This chemical reaction can be represented by the following chemical equation with state symbols of the reactants and products: →

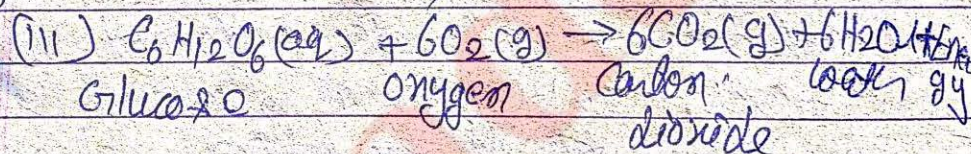
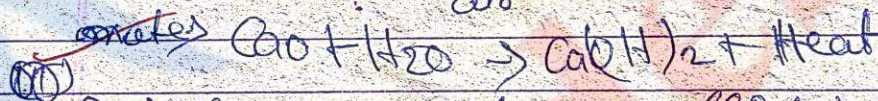
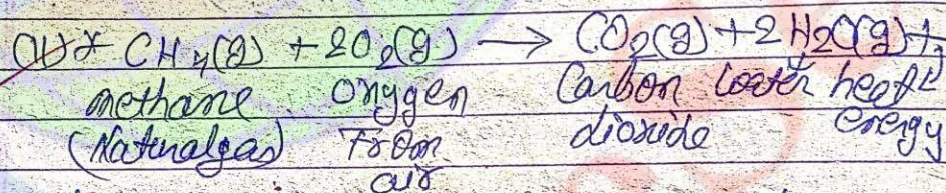
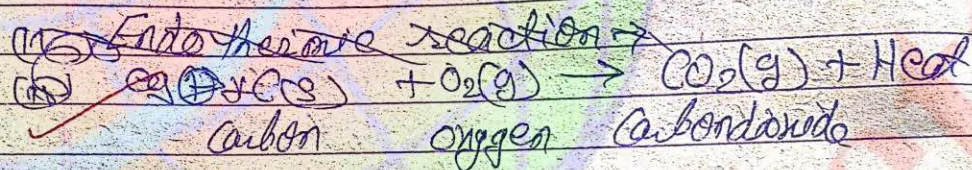


(2) To Indicate the heat changes in an equation :-

There are two types of reaction on the basis of heat changes involved:

- (i) Exothermic reaction
- (ii) Endothermic reaction

(i) Exothermic reaction \rightarrow (Heat evolve)
 $+ \text{Heat}, + \text{Energy} + \Delta$ (delta) is added in the product side



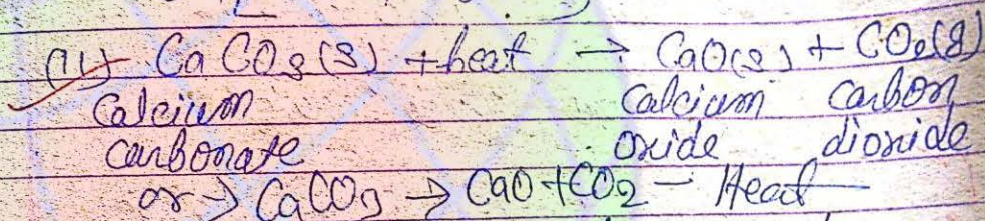
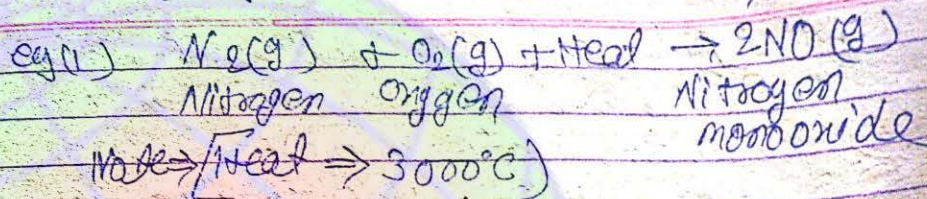
(ii) Endothermic reaction \rightarrow (heat absorb)

In this reaction $+ \text{Heat}, + \text{Energy}, + \text{Heat-Energy}, + \Delta$ is added in reactant side

or $- \text{Heat}, - \text{Energy}, - \text{Heat energy}, - \Delta$ is subtracted in the product side

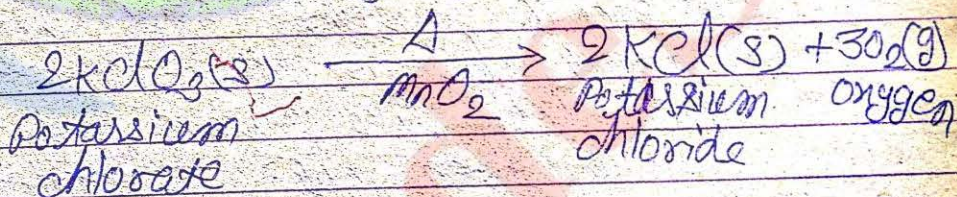
$\Delta \rightarrow$ Delta (Heat sign)

Catalyst \rightarrow Reaction in solid state or liquid state
 [atp \Rightarrow atmospheric pressure]



(3) To Indicate the condition under which the reaction takes place: \Rightarrow

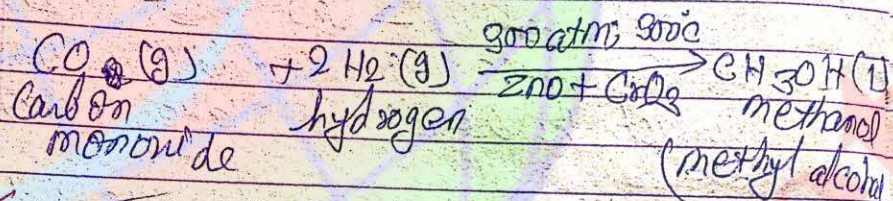
eg \Rightarrow when Potassium chlorate ($KClO_3$) is heated in the presence of manganese dioxide catalyst, it decompose to form potassium chloride and oxygen gas.



Here delta (Δ) stands for heat and MnO_2 is the catalyst. so above equation shows the condition under which the reaction take place.

(2) methanal (or methyl alcohol) is manufactured from carbon monoxide and

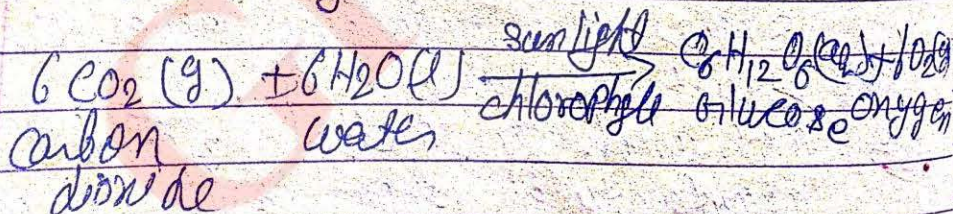
hydrogen. The mixture of carbon monoxide and hydrogen gases is compressed to 500 atmospheres. Pressure and then passes over a catalyst consisting of a mixture of zinc oxide and chromium oxide heated to a temperature of 300°C.



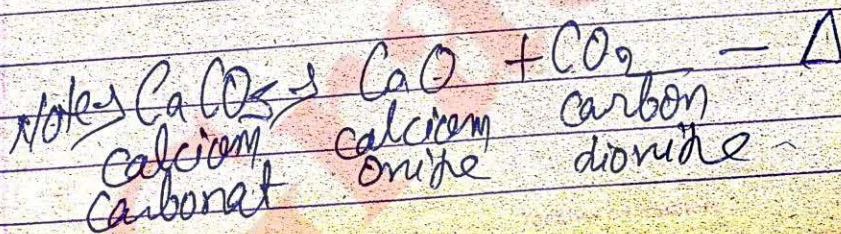
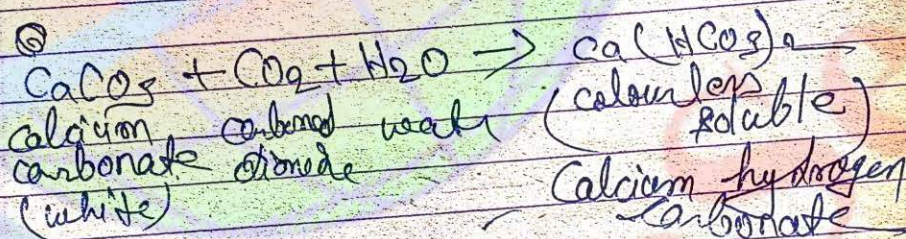
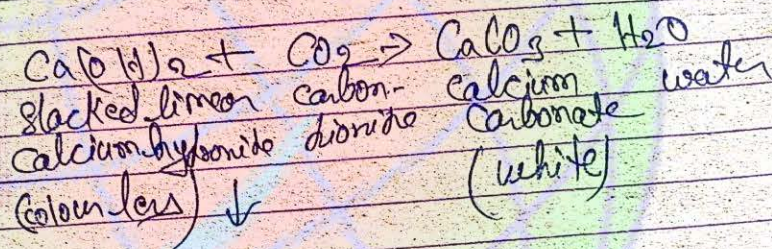
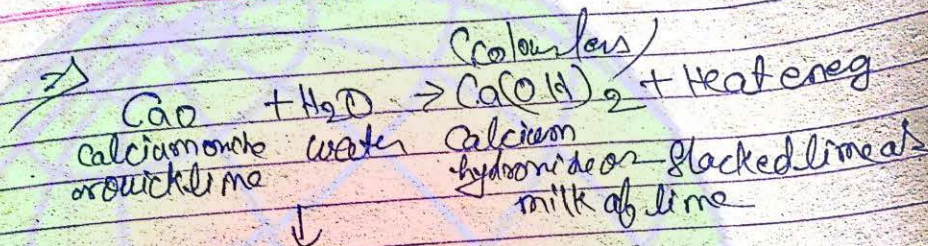
(31)

(3)

The green plants make food by photosynthesis. During photosynthesis, carbon dioxide combines with water in the presence of 'sunlight' and the green pigment of leaves called 'chlorophyll' to make food like glucose and oxygen was given out. The conditions for the reaction of photosynthesis to take place are the presence of sunlight and chlorophyll.



Test of CO₂ and H₂O ⇒



start →
→ Acid, Base and Salt

On the basis of the chemical properties compound divided into three parts: →

- i) Acid
- ii) Base
- iii) Salt

* Acids → Those chemical substance which have sour in taste are called the acid.

Acids are divided into two parts.

- 1) organic substance
- ii) inorganic substance

* 1) * Organic substance → Those acids which are obtained from the living things are called the organic acid.

eg → lemon → citric acid / ascorbic acid

orange → Citric acid

Tangraind / Grapes → Tartaric acid

Apples → malic acid

Tomato → Oxalic acid

Curd → Lactic acid

vinegar → Acetic acid

Red ant → Formic acid

Guava → Citric acid.

Q. Why the bite of the red ant is painful?
Ans. When red-ant bite our bodies then it release the formic acid in our body, which causes burns. Due to this bite of red ant is painful.

* II) Inorganic acids - These acid which are obtained from the minerals are called the inorganic acids
eg. Sulphuric acid
Hydrochloric acid
Nitric acid etc.

inf.
hen

There are two types of the acids →
1) Strong 2) on the basis of its strength
- are

- 1) Strong acids
- 2) Weak acids

this
is
not

Strong acid → All the mineral acids are the strong acid. eg, H_2SO_4 , HCl , Nitric acid etc.

Weak acid → Organic acids are the weak acids. eg - Citric acid, Formic acid, tartaric acid, carbonic acid.

Concentrated acid → A mixture of 90% acid and 10% of water. is called concentrated acid.
Its symbol (Conc)

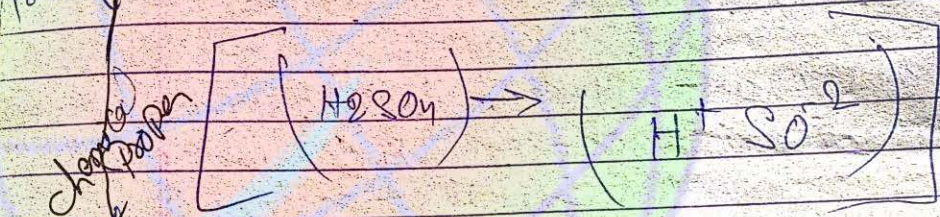
Dilute acid → A mixture of 90% of the water and 10% of acid is called dilute acid.

symbol (Dil)

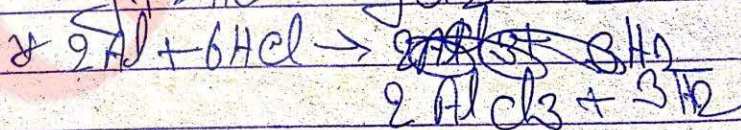
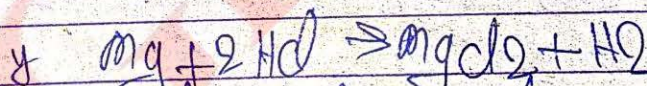
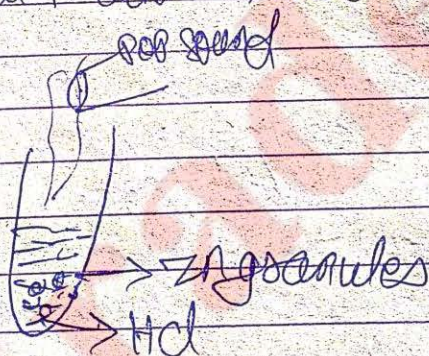
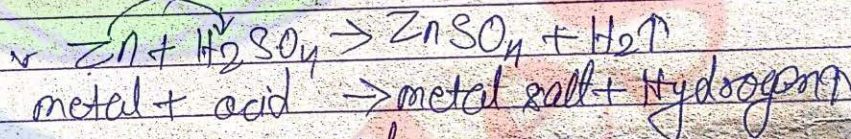
(liquid / molten / aqueous)

Properties of acid

Physical property
 (i) Acid is sour in taste.
 (ii) It turns blue litmus into red.
 (iii) It conducts the electricity in molten form.



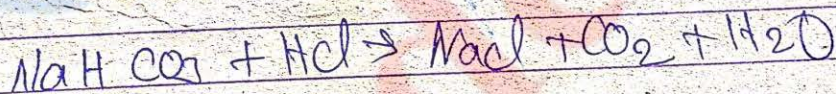
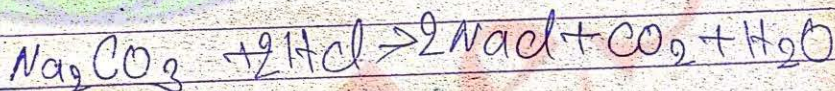
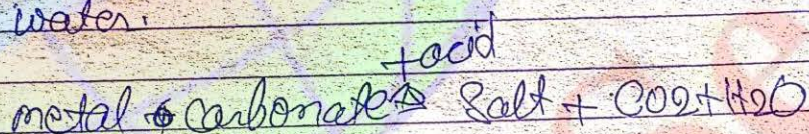
Chemical property
 (v) Acid react with metal to form hydrogen gas.



$CaOCl_2 \Rightarrow$ Chloro calcium \Rightarrow calcium oxychloride
common name \Rightarrow Bleaching powder

* Acid containing food stuff do not kept in a metal plates because acid present in a food stuff react with a metal and makes food poisonous

\Rightarrow Acid react with metal carbonate \Rightarrow when acid react with carbonate it forms salt, carbon dioxide and water.



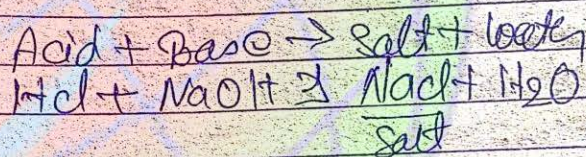
In this reaction obtained gas

Gas obtain in this reaction passes through the lime water it turns milky. it shows that gas is carbon dioxide gas.

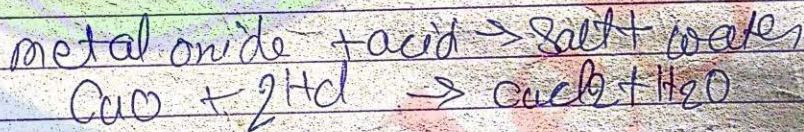
Sodium hydroxide → सोडा वरिष्ठ जोल acid
अम्ल का द्रव जोल (चरित liquified
अम्ल)

i) Acid react with base:

When acid react with base it form salt and water, and this reaction is called neutralization reaction



ii) Acid react with metal oxide to form salt and water.



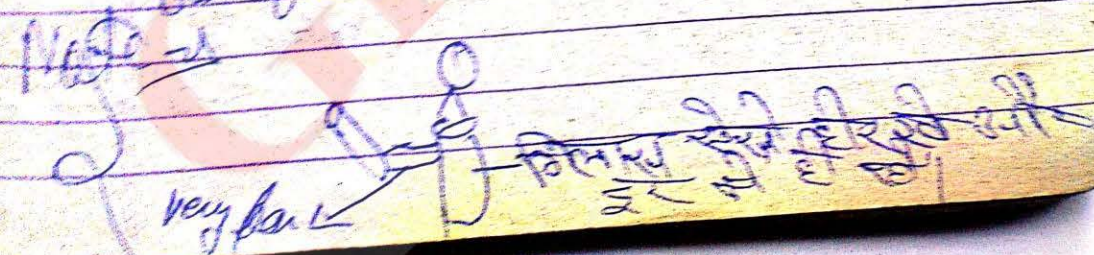
In this reaction is also form salt and water, so this reaction can also called neutralization reaction, i.e. metal oxide are basic in nature.

Properties of acid with metal
acid + base → salt

Acid have to concave surface
The metal acid cause severe burn
on the skin and attack and eaten
of materials called corrosion

while diluting an acid into water
elements, acid that the acid
should be added to the water
and not water to the acid.

The process of mixing of acid and
water is highly exothermic. So acid
is gradually added to the water
which easily absorb the large amount
of water and prevent from the
explosive formation of steam
of water which cause acid burn
on face cloth etc.

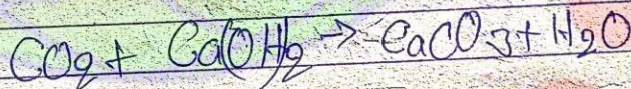


वे रिएक्शन में बaking soda की मात्रा
 में HCl की Nutrilise करता है

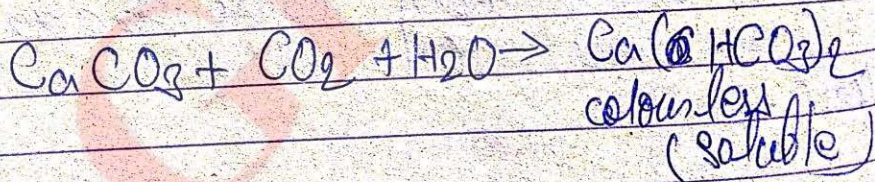
Q → what happens gas carbon dioxide is
 passed through lime water

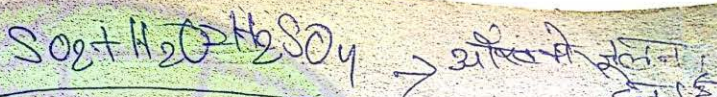
- a) for a short time
- b) for a considerable time
- c) write equation of the reaction
 involve

Ans a) when carbon dioxide is passed
 through the lime water it turns
 milky white due to the formation of
 precipitate calcium carbonate



b) After a considerable time when
 excess carbon dioxide is passed
 through them then it form
 soluble salt calcium hydrogen
 carbonate $(\text{Ca(HCO}_3)_2)$ and it
 becomes clear again





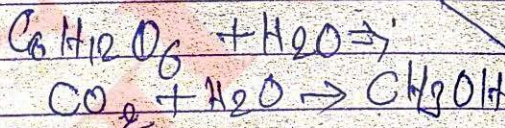
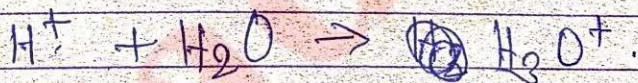
Formic acid or methanoic acid

Acid

An acid is a substance which dissociates or ionised on dissolving in water to produce hydrogen ion
 eg $\rightarrow HCl(aq) \rightarrow H^+ + Cl^-$

Here in a water solution hydrogen ions makes it like to show the acidic behavior:

H^+ ion do not exist in a solution which combine with another water molecules to form H_3O^+ .



Q → All hydrogen containing compounds are acids?

Ans No. Those hydrogen containing compounds which produce H^+ ions in a water are acid.

eg → HCl , H_2SO_4 , HNO_3 etc.

These compounds which do not produce H^+ in a solution are not the acidic compounds.

eg → $C_6H_{12}O_6$
Alcohol →

Test to distinguish between acid and Bases →

Indicators	Natural colour	show colour in acid	show colour in base
<p>1) Litmus indicators</p> <p>↳ is belongs from living plant which is plant kingdom.</p>	<p>Natural Indicator</p> <p>Purple</p> <p>(it extracted from living plant which is plant kingdom)</p>	<p>In acid turns blue. litmus to red</p>	<p>In base turns red litmus to blue</p> <p>(Note) litmus solution does itself in neither acid nor base.</p>
<p>2) Turmeric (Haldi)</p>			

Physical Property - (i), (ii), (iii)
Chemical Property - (iv), (v), (vi), (vii)

Alkali \rightarrow These substance which are soluble in water are called the alkalis.

eg \rightarrow Sodium hydroxide, $\text{mg}(\text{OH})_2$

Note \rightarrow All Alkalis are bases but all bases are not a alkalis.

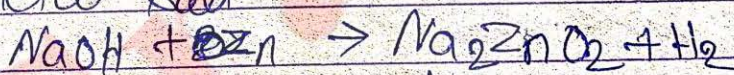
Properties of bases \rightarrow

There are following properties of the base \rightarrow

- i) It have bitter in taste.
- ii) It turns red litmus into blue.
- iii) Bases feel soapy to touch.
- iv) It is a good conductor of electricity in molten solution state.

v) Reaction with metal \rightarrow

When bases are react with the metal to produce hydrogen gas and metal salt.



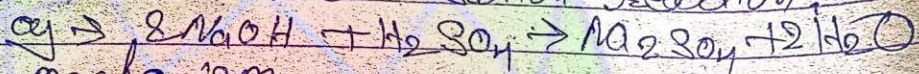
\downarrow
Sodium

zincate

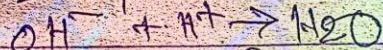
Note \rightarrow

All the metal do not react with base.

v) Reaction of base with acids. \rightarrow
 Bases react with acids to form salt and water and their reaction is called neutralization reaction.

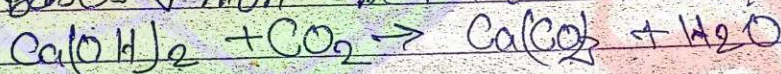


Mechanism



vii) Bases react with non-metal oxide to form salt and water.

Bases + Non-metal oxide \rightarrow Salt + water



Non-metallic oxides are acidic in nature.

Uses of base. \rightarrow

1) Sodium hydroxide is used in manufacturing of soap, paper, synthetic fibres etc.

2) Calcium hydroxide is used to manufacturing of bleaching powder.
 \downarrow
 CaOCl_2

- iii) Magnesium hydroxide is used as antacid.
- iv) Sodium carbonate is used washing soda for softening the hard water.
- v) Sodium bicarbonate is used as a baking soda.
- vi) fire-extinguishers, antacid.

Notes → ~~Met~~ Non-metallic Oxides are acidic in nature.

→ Usage of bases: →

- i) Sodium hydroxide is used in manufacturing of Soap, Paper, Scientific fibres etc.
- ii) Calcium hydroxide is used manufacturing of bleaching powder.
- iii) Magnesium hydroxide is used as an antacid.
- iv) Sodium carbonate is used washing soda for softening the hard water.
- v) Sodium bicarbonate is used as a baking soda, fire extinguisher antacid.

High demand sulphate in kitchen had waste

PH

Scale

PAGE: / /
DATE: / /

~~1000~~ $\log \rightarrow$

$\star 1000 = 10^3$

$\rightarrow \log_{10} 1000 = 3$

$\star 8 = 2^3$

$\rightarrow \log_2 8 = 3$

$\star \log_2 16 = 4$

$\rightarrow 16 = 2^4$

$2^4 = 2^4$

$\therefore 4 = 4$

Find the value of x

$$\Rightarrow \log_2 82 = x$$

$$\log_2 27 = x$$

$$27 = 2^x$$

$$3^3 = 2^x$$

$$x = 3$$

$$\Rightarrow \log_2 \frac{1}{2} = x$$

$$\frac{1}{2} = 2^x$$

$$x = -1$$

$$\Rightarrow \log_{10} 10 = x$$

$$10 = 10^x$$

$$x = 1$$

$$\Rightarrow \log_{10} 10^1 = x$$

$$10 = 10^x$$

$$10^1 = 10^x$$

$$x = 1$$

क्या नहीं हो 10

i) Product formula \Rightarrow

$$\log(ab) \Rightarrow \log a + \log b$$

$$\log(abc \dots) = \log a + \log b + \log c + \dots$$

ii) \Rightarrow Quotient formula \Rightarrow

$$\log\left(\frac{a}{b}\right) = \log a - \log b$$

iii) \Rightarrow Exponent formula \Rightarrow

$$\log a^n = n \log a$$

$$\log_a a = 1$$

$$\log_a 1 = 0$$

1) Evaluate the following

$$\log 2 + \log 4 + \log 25 =$$

$$\log(2 \times 4 \times 25)$$

$$\log_{10} 1000 = \log_{10} 10^3 = 3 \log_{10} 10$$

$$\rightarrow 3 \times 1$$

$$\rightarrow 3$$

$$2) \log 25 + \log 8 = \log 200$$

$$\log(25 \times 8) = \log 200$$

$$\log 200 = \log 2 \times 100$$

$$\log 400 = \log 10$$

$$\log \frac{25 \times 8^2}{2} = \log 100 = \log 10^2$$

$$\rightarrow 2 \log 10$$

$$\rightarrow 2 \times 1$$

$$\rightarrow 2$$

(minus से चिह्न होता है)
 \log_{10} का value 1 होता है,

iii) $\log 0.001$

$$\log \frac{0.001}{1000} \Rightarrow \log \frac{1}{10^3} \Rightarrow \log 10^{-3}$$

$$\Rightarrow -3 \log_{10} 10$$

$$\Rightarrow -3 \times 1$$

$$\Rightarrow -3$$

iv) $\log 0.0002 = \log 2$

$$\log \frac{0.0002}{10000} \times \frac{1}{2} \Rightarrow \log \frac{1}{10^4}$$

$$\Rightarrow \log_{10} 10^{-4}$$

$$\Rightarrow -4 \log_{10} 10$$

$$\Rightarrow -4 \times 1$$

$$\Rightarrow -4$$



pH value scale :->

The pH of a solution is ^{log of} inversely proportional to the concentration of the hydrogen ion.

~~$\log [H^+]$~~

pH value $\Rightarrow \log \frac{1}{[H^+]}$

$\Rightarrow \log [H^+]^{-1}$

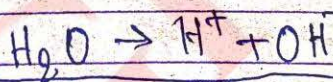
(Equivalent formula)

$\Rightarrow -\log [H^+]$

pH value is again defined as

Negative logarithm of a concentration of hydrogen ions.

Water ionic Product \Rightarrow



$[H^+] \times [OH^-] = 10^{-14}$

why $10^4 \rightarrow$

in water

$$[H^+] = [OH^-] = x \text{ (let)}$$

$$[H^+] \times [OH^-] = 10^{-14}$$

$$\rightarrow x \times x = 10^{-14}$$

$$\rightarrow x^2 = 10^{-14}$$

$$\rightarrow x = \sqrt{10^{-14}}$$

$$\rightarrow x = 10^{-7}$$

$$\rightarrow [H^+] = [OH^-] = 10^{-7}$$

Q. In a solution concentration of OH^- is 10^5
Find H^+ ions.

$$[H^+] \times 10^5 = 10^{-14}$$

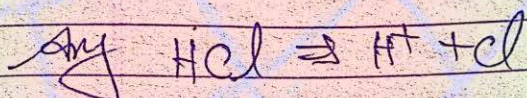
$$\rightarrow H^+ = \frac{10^{-14}}{10^5}$$

$$\rightarrow H^+ = 10^{-14+5}$$

$$\rightarrow H^+ = 10^{-9}$$

Q.1 → The concentration of HCl in a solution 0.001M (molarity).

Q.2 → The concentration of hydrochloric acid in a solution 0.001M. Find the pH value.



H⁺ = 0.001M

$$\frac{0.001}{1000} = 10^{-3}$$

pH value = $-\log [H^+]$

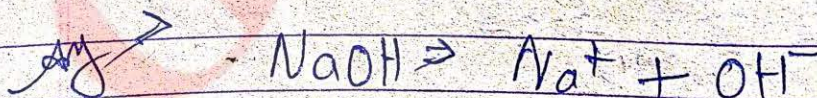
$\Rightarrow -\log 10^{-3}$

$\Rightarrow (-3) \times \log 10$

$\Rightarrow 3 \times 1$

$\Rightarrow 3$

Q.3 → The concentration of ~~NaOH~~ NaOH solution is 0.001M. Find the pH value.



m stand for molarity

$$[\text{OH}^-] = 0.001 \text{ M}$$

$$\Rightarrow \frac{1}{1000} \text{ M} = 10^{-3}$$

$$[\text{H}^+] [\text{OH}^-] = 10^{-14}$$

$$[\text{H}^+] \times 10^{-3} = 10^{-14}$$

$$[\text{H}^+] = 10^{-11}$$

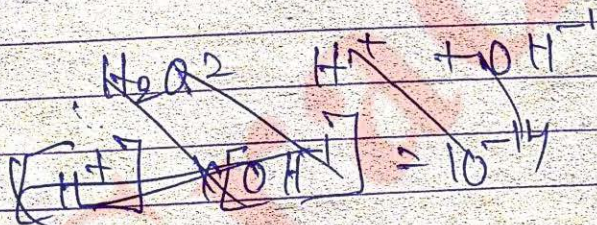
$$\text{pH value} = -\log [\text{H}^+]$$

$$\Rightarrow -\log 10^{-11}$$

$$\Rightarrow -1 \times -11$$

$$\Rightarrow 11$$

as find pH value of H_2O



$$\text{pH value} = -\log [\text{H}^+]$$

$$\Rightarrow -\log 10^{-7}$$

$$\Rightarrow 7$$

pH Scale

The strength of an acid or base measured by a scale which is called pH scale.

i) Neutral substances have pH value 7.

• eg → water, sugar solution etc.

ii) Acid solution have pH value less than 7.
(Lower the pH value stronger the acid)

In change methyl orange into red.

iii) Bases solution have pH value more than 7.

(Note → Concentration of H^+ or OH^- pH value)

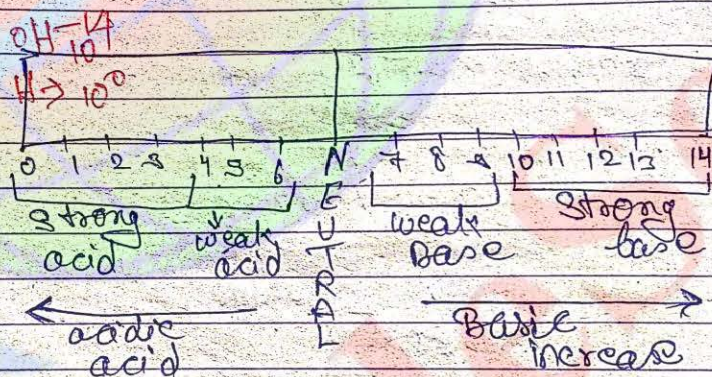
H^+	OH^-	pH
10^{-6}	10^{-8}	6
10^{-5}	10^{-9}	5
10^{-4}	10^{-10}	4
10^{-3}	10^{-11}	3
10^{-2}	10^{-12}	2
10^{-1}	10^{-13}	1
00	10^{-14}	0

Note → 10^{-1} is $\frac{1}{10}$ 10% and 10^{-2} is 1% (0.1%)

OH जमाया का मतलब Base है
 H⁺ का जमाया रहना Acid बनता है

H ⁺	OH ⁻	pH
10 ⁻⁶	10 ⁻⁸	6
10 ⁻⁷	10 ⁻⁷	7
10 ⁻⁸	10 ⁻⁶	8
10 ⁻⁹	10 ⁻⁵	9

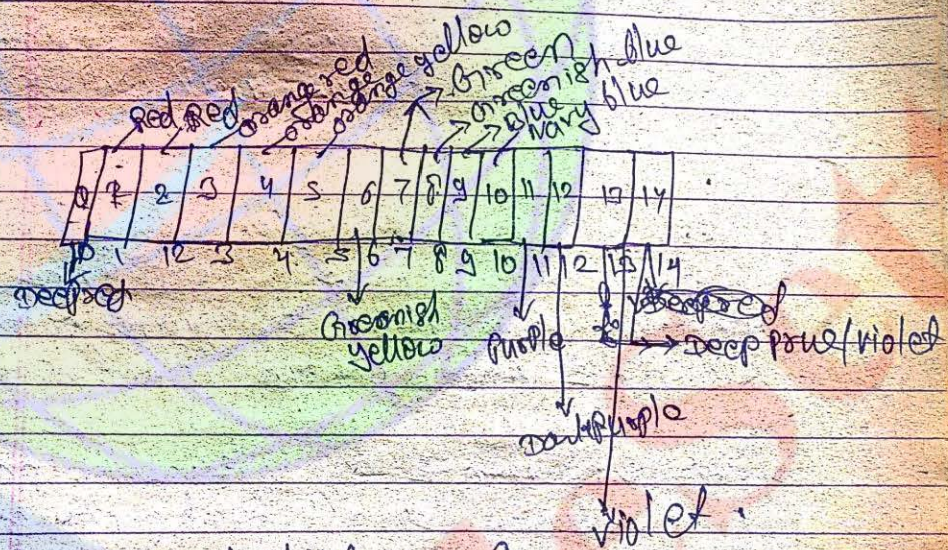
⇒ pH scale



⇒ Selection ⇒ pH value

- I) Conc hydrochloric acid → 0
- II) ~~Conc~~ aqueous HCl → 1
- III) Gastric juice (HCl) → 1.4
- IV) lemon juice → 2.5
- V) vinegar → 4
- VI) milk → 6.5
- VII) water → 7

- (1) Blood → 7.4
- (2) Toothpaste → 8
- (3) Milk of magnesia → 10.5
- (4) Sodium hydroxide → 13
- (5) Conc NaOH → 14



Universal indicator

Universal indicator is a mixture of many different indicators which gives different colours at different pH value of the indire pH scale.

↳ pH scale value depends on the concentration of hydrogen ion.

pH \rightarrow HNO_3 ions

ii) To find the pH value like litmus or universal indicators can be used either in the form of solution or in the form of universal indicator paper.

iii) with help of a dropper drop of the solution is put over the indicator papers whose colour will be change.

\Rightarrow Some other Indicator for testing acid and bases

i) Methylene (orange) \rightarrow It turns red in acid and yellow in base.

ii) phenolphthalein \rightarrow is colourless in acid and turns in a pink colour in a base.

\Rightarrow Olfactory Indicator \rightarrow Those substance whose smell or odor change in a acid or base solution are called olfactory indicators.

1) ~~Onion~~ Onion has a characteristics smell. ~~When~~ when base solution is added then its can be smell its smell can not be accepted. But acid cannot destroy its smell.

2) Benila has a pleasant smell but adding the base its smell destroy but acid can not be destroy its smell.

~~note~~
pH scale is discovered by the Sorenson

Importance of pH in everyday life.

1) pH in our digestive system →
gastic juice → 1.4

In our stomach gastic juice hydrochloric acid is released whose pH value is 1.4. The excess acid is released in

Our stomach causes indigestion which produce pain and irritation. This pain and irritation can be removed by antacid which neutralize the acid. In common antacid (milk of magnesia $Mg(OH)_2$ and sodium bicarbonate $NaHCO_3$).

ii) pH change as the cause of tooth decay

The bacteria present in our mouth break down the sugar containing food in the form of acid which causes the lower of pH value 5.5 and our teeth start decay.

To prevent this decay of teeth to clean mouth with toothpaste which neutralize the acid.

iii) Plants and animals are sensitive for pH change.

Soil pH ~~and~~ The most of plant grow based when pH value of soil

is 7. but rising and falling of pH value effect the growth of plants.

To prevent the acidification of soil quick lime (CaO) or calcium hydroxide (Ca(OH)_2) can be used.

Basidity of soil can be reduced by using many organ or manure.

iii) Change of pH aquatic animal can not survive

generally pH value of the water is 7 to 7.8 due to the acidic rains its pH value decreases in which survive of the aquatic animals becomes difficult.

It can be prevent by using quicklime (CaO) and slaked lime (Ca(OH)_2).

iv) Self defence by animals and plants - many animals and plants protect them selves from their enemies

by ~~ingetching~~ ~~printed~~ acids and base

Salt

Salt is a compound which is form by the neutralization reaction of the acid and base.

name of the salts come from the it source acid →

i) The salt of HCl are called chloride
 eg → NaCl → Sodium chloride
 MgCl₂ → Magnesium chloride

ii) The salt of H₂SO₄ are call Sulphate
 Na₂SO₄ (Sodium Sulphate)
 Mg (SO₄)₂ magnesium Sulphate

iii) The salt of Nitric acid are called Nitrate

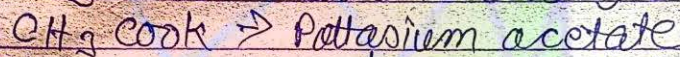
eg → NaNO₃ → Sodium Nitrate
~~Na~~ KNO₃ → Potassium Nitrate

iv) The salts H₂CO₃ ^(carbonic acid) is called carbonate
 CaCO₃ (calcium carbonate)

S



r) The salt of acetic acid (CH_3COOH) is called acetate.

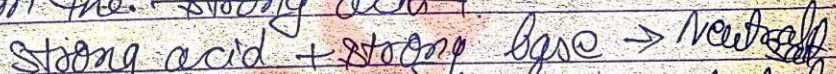


\Rightarrow Family of salt (Neutral salt)

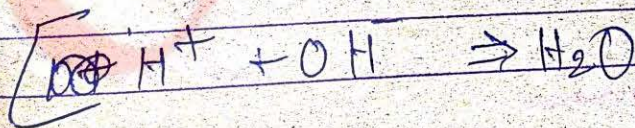
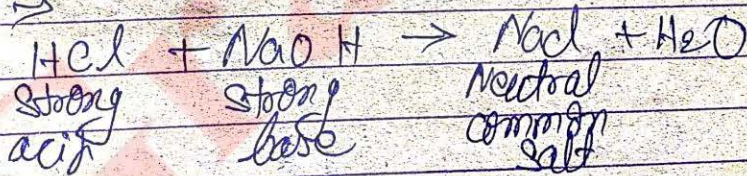
Family of salt \rightarrow A salt in which positive ions and negative ions are same is called family salt.

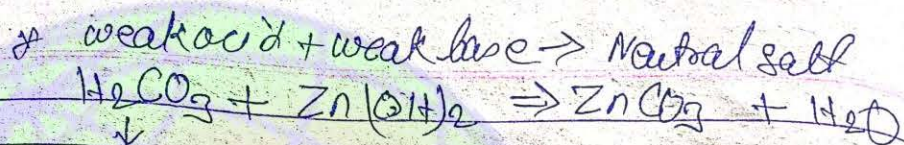
i.e. the salt obtain

from the strong acid +



eg \rightarrow





\Rightarrow The pH of the Salt Solution: \rightarrow

There are three types of the salt: \rightarrow

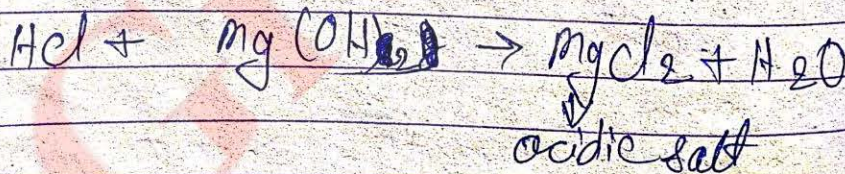
I) Neutral salt \rightarrow The salt obtain from the strong acid and strong base or weak acid and weak base are called neutral salt.

The pH value of neutral salt is 7.

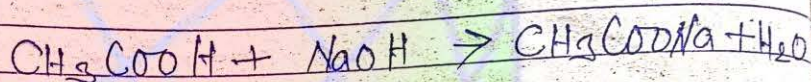
eg \rightarrow Common salt
Potassium chloride
Zinc carbonate

II) Acidic salt \rightarrow The salt obtain from the strong acid and weak base are called acidic salt.

The pH value of acidic salt is less than 7.



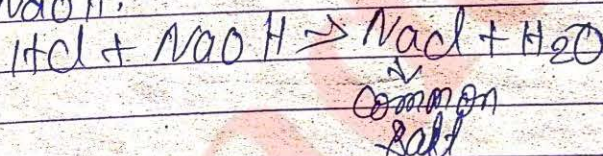
ii) Basic salt \Rightarrow The salt obtain from the weak acid and strong base is called basic salt.
 its pH value is more than 7.



\rightarrow Common Salt

① chemical formula \rightarrow NaCl
 chemical name \rightarrow Sodium chloride
 Commercial name \rightarrow Common salt.

Common obtain in a laboratory by the reaction of the HCl and NaOH.



ii) Common salt obtain in a large amount of sea water.

iii) Common salt also obtain from the rock salt as a mineral

inside the earth.

Uses of Common Salt

It is used in a large scale in a chemical industries for making sodium hydroxide, sodium carbonate, washing soda, Baking soda, hydrochloric acid etc.

It is used in preserving the food item - eg milk, fish, pickle, etc.

It is used in a cooking food which required our body for the working of nervous system, movement of muscles, production of hydrochloric acid.

Common salt is used in a manufacturing of soap.

Common salt is used melting the ice.

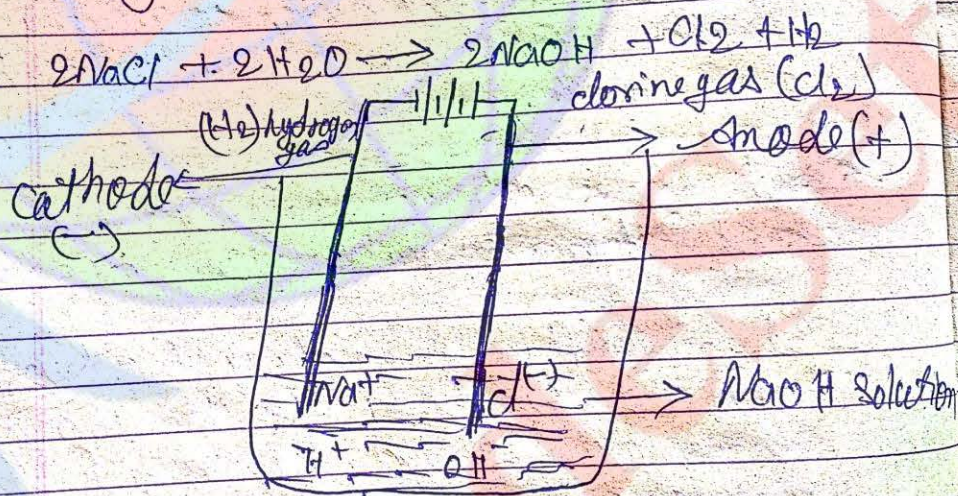
(melting, Boiling, Freezing point)

Sodium hydroxide

chemical formula \rightarrow NaOH
 Commercial name \rightarrow Caustic Soda

Production of Sodium hydroxide -

When electricity pass through the concentrated sodium chloride it get decompose to form sodium hydroxide, chlorine and hydrogen.



In this process chlorine gas is obtain at anode and hydrogen gas at cathode and sodium hydroxide solution form near the cathode. The process of electrolysis

Aq. sodium chloride solution is called chlor-alkali process.

⇒ Uses of Sodium hydroxide: ⇒

- i) It is used for making soap and detergents.
- ii) It is used for making artificial fabrics.
- iii) It is used in the manufacturing of the paper.
- iv) It is used in purifying ~~ore~~ bauxite ore from which
- v) Extraction of the aluminium from bauxite
- vi) It is used in de-greasing metals, oil refining, and making dyes and bleaches.

⇒ Uses of chlorine

- i) It is used to kill the germs in a water.
- ii) It is used in manufacturing of bleaching powder, hydrochloric acid

(must react with oxygen)
colour and taste)

plastic, chloroform carbon.
iii) It is used for making solvents
for drycleaning. (must colour
and taste)

⇒ Uses of hydrogen

i) It is used for hydrogenation of oils
to obtain the desirable vegetable
ghee.

ii) It is used for formation of hydrochloric
acid, ammonia, methanol etc.

iii) It is used as a fuel in a rocket.

⇒ Uses of hydrochloric acid

i) It is used to clean the iron sheet.

ii) It is used for preparation of
ammonium chloride.

iii) It is used in medicines and
cosmetics.

iv) It is used in textile and plastics.

Washing Soda

Chemical formula $\rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

chemical name \rightarrow Sodium carbonate
deca hydrate

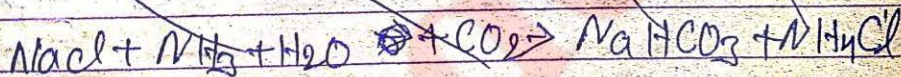
Commercial name \rightarrow washing soda

\Rightarrow Production of washing Soda.

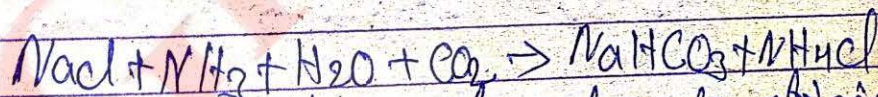
Washing soda is an important chemical which is obtain from ^{mixture of} sodium chloride, ammonia and carbon dioxide called ~~brine~~ brine.

There are following steps.

Δ ~~The brine~~ ^{conc NaCl} (brine) they are react to form sodium bi-carbonate and sodium chloride

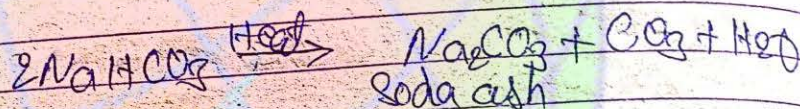


Δ Conc NaCl react with NH_3 and CO_2 to form sodium bi-carbonate and ammonium chloride.

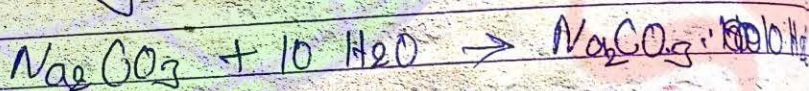


Δ Sodium bi-carbonate obtain in a precipitate form which are separated

by the filtration process.
 Filter sodium sodium bi-carbonate on heating get decompose to form sodium carbonate called Soda ash.



ii) Soda ash dissolve in a water and get recrystallisation to form washing soda.



→ Properties of washing soda

- i) it is transparent crystal solid.
- ii) it is soluble in water.
- iii) its solution turns red litmus blue.
- iv) it has cleaning properties.

⇒ Uses of washing

- i) It is used as a cleaning agent.
- ii) It is used to remove permanent hardness of water.
- iii) It is used in manufacturing of glass, paper, soap.
- iv) It is used for manufacturing of borax.

Baking Soda

Chemical formula \rightarrow NaHCO_3
Chemical names \rightarrow Sodium bicarbonate /
Sodium hydrogen carbonate

Commercial name \rightarrow Baking Soda.

⇒ Production of Sodium hydrogen carbonate
Baking soda is obtained from the concentrated solution of sodium chloride called brine and ammonia, carbon dioxide by following reaction:



⇒ Properties of Baking

- i) It is soluble in water.
- ii) It is mild and non-corrosive base.
- iii) On heating it produces sodium carbonate.

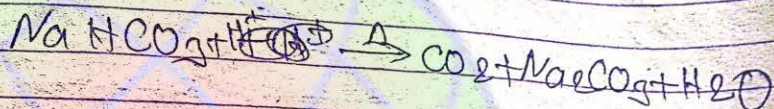


⇒ Usage of Baking Soda.

It is used ⁱⁿ Baking powder. Baking powder is a mixture of Baking Soda and tartaric acid.

Baking powder is used making the bread cake etc. when Baking powder is mixed with water and cake making materials then carbon dioxide gas is released slowly, ~~not~~ rise the base and it becomes soft and spongy and its bitter taste is neutralized by tartaric acid present in

Baking powder



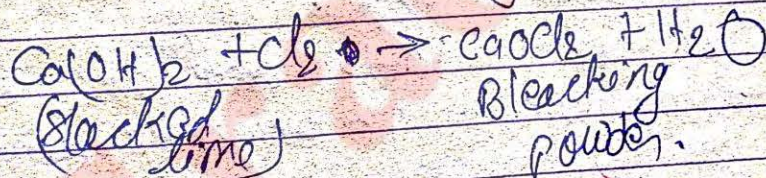
- ii) It is used in antacid.
- iii) It is used in fire extinguishers.

Bleaching Powder

Chemical formula ~~CaOCl₂~~ CaOCl_2
Chemical name \rightarrow calcium oxy chloride.
Commercial name \rightarrow Bleaching powder.

\Rightarrow Preparation of Bleaching powder \Rightarrow

Δ Bleaching powder is prepared by chlorine over dry slaked lime.



Properties of Bleaching powder

- i) It is white powder given strong smell of chlorine.
- ii) It is soluble in cold water.
- iii) It reacts when ~~react~~ with dilute with dilute acid ~~separates~~ chlorine.

Preparation

Uses of Bleaching powder

- i) It is used in the laundry for bleaching ^{clothes}.
- ii) It is use a disinfecting ^{water} for drinking water.
- iii) It is use for manufacture of chloroform (CHCl_3).
- iv) It is used to make wool for unshrinkable.
- v) It is use as a oxidizing agent.

Plaster of Paris

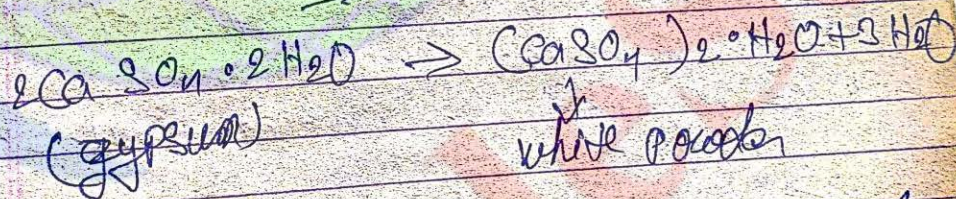
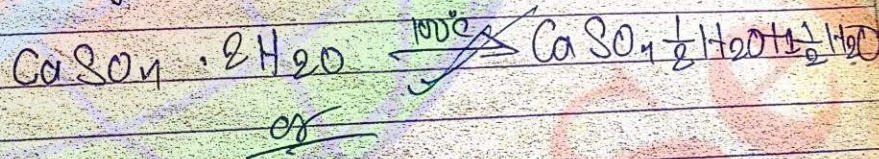
chemical formula $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

chemical name \rightarrow calcium sulphate hydrate

commercial name \rightarrow plaster of paris (POP)

\Rightarrow Preparation of plaster of paris

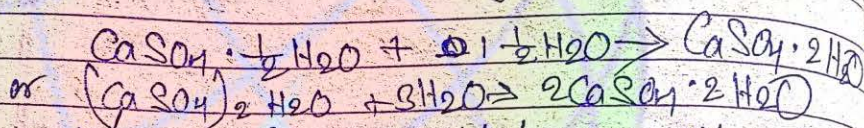
Δ Plaster of paris prepared by getting heating at 100°C or 373K



if gypsum is heated above 100°C then all the water of ~~it~~ ~~is~~ ~~got~~ removed and anhydrous calcium sulphate is formed called dead plaster of paris in form which ~~lost~~ the setting properties

Properties of plaster of Paris

- i) It has white powder
- ii) It has heating properties



When water is added to the plaster of Paris then it convert into solid crystal gypsum which is hard.

Usage of Plaster of Paris

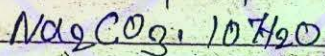
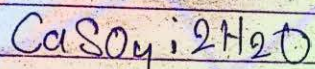
- i) It is used in hospital for setting the fracture of the bones.
- ii) It is used for making toys, statues, chalk
- iii) It is used as a fire proof material.
- iv) It is used for sealing the gaps in an aqueduct.
- v) It is used for making the surface smooth.

Water of Crystallisation :->

The water molecules which form part of structure of a crystal are called water of crystallisation.

Hydrated Salt :->

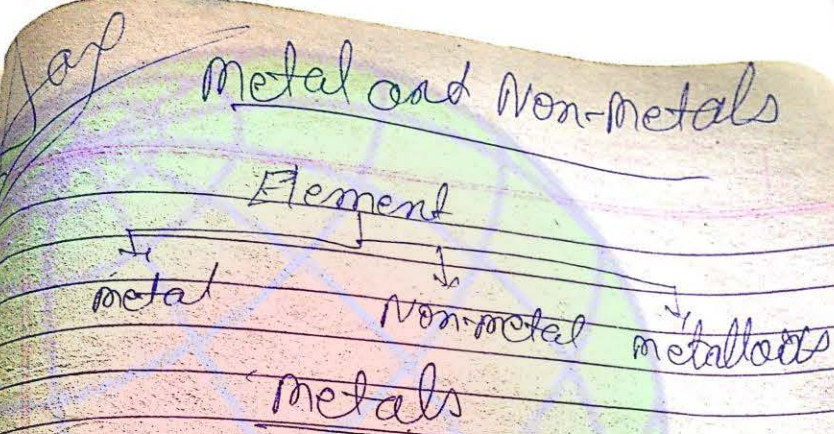
Those salt which contain water molecules are called hydrated salt.



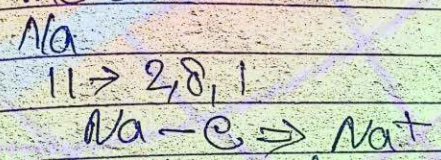
M.F.R.T

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⇒ metal → The elements which have good conductors of heat and electric lustrous, sonorous etc are called metal.



On the basis of electronic concept these elements which loses the electrons and form positive ions are called metals.

- eg → Sodium (Na), Potassium (K), magnesium (Mg), Zinc (Zn), Aluminium (Al), copper (Cu), gold (Au), silver (Ag)

* Physical properties of metals:

⇒ metals are malleable
 metals can be bitten into

thin sheets called malleability

Gold, and silver metals are best ~~as~~ silver malleable metals.

Aluminium (Al) foils are used for packing food items because it is highly malleable.

ii) All metals are ductile.

metals can be drawn into thin wire called ductility.

Gold is the highly ductile metal one gram of gold can be drawn into thin wire about 2km long.

Copper and aluminium also have ductile that's why it is used as thin wire.

iii) Metals are good conductor of electricity and heat.

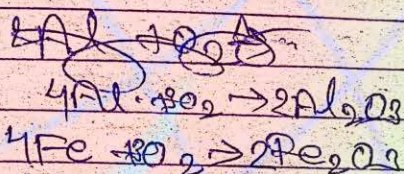
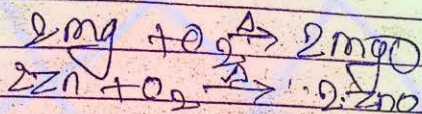
② Silver is the best conductor of heat and electricity.

iv) Metals are lustrous.

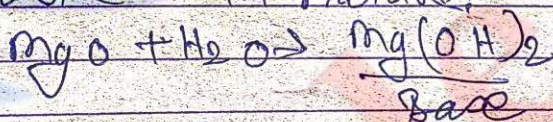
All the metals have a property to a special type of

Chemical Properties of metals

⇒ Some metals react with oxygen on heating →



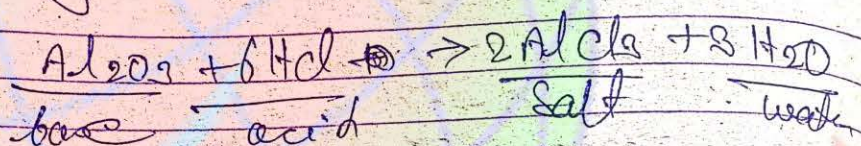
The solution of metal oxides which are soluble in water turn red litmus blue i.e. metal oxides which are soluble in water which are basic in nature.



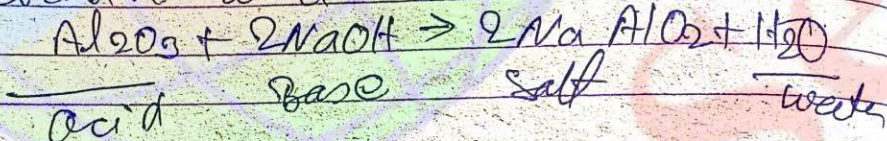
Amphoteric oxide → Those metal oxides which show both basic as well as acidic behavior are called

Amphoteric oxide
 eg → Aluminium oxide, Zinc oxide,

Aluminium oxide ~~also~~ react with Hydrochloric acid (HCl)

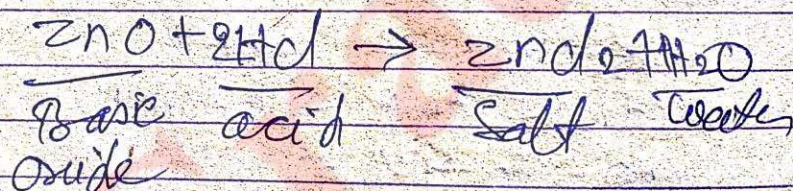


In this reaction aluminium behaves as a basic oxide.



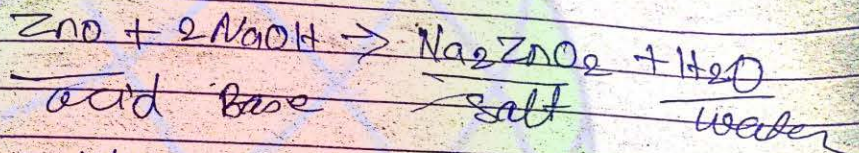
In this reaction Aluminium oxide behaves as an acidic oxide.

* Zinc oxide react with HCl



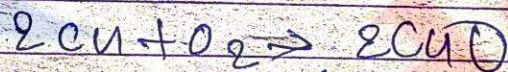
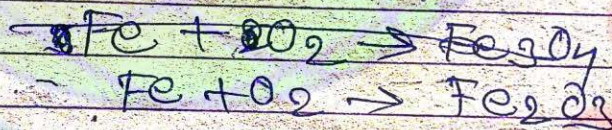
In this reaction zinc oxide behaves as basic in nature.

• Zinc oxide react with sodium hydroxide



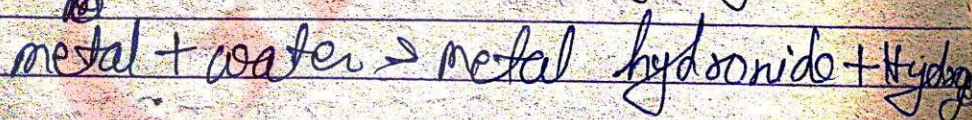
on this reaction, zinc oxide shows acidic in behavior.

⇒ ^{copper} Irons react with oxygen on strong heating.

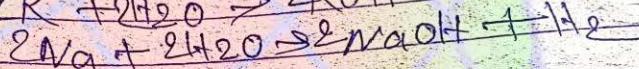
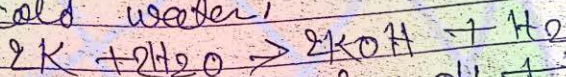


2) Reaction of metal with water

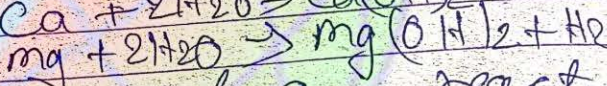
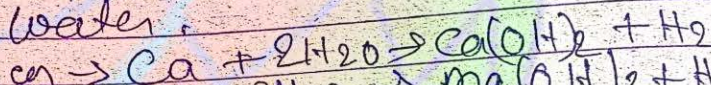
metal react with water to form metal hydroxide and hydrogen gas.



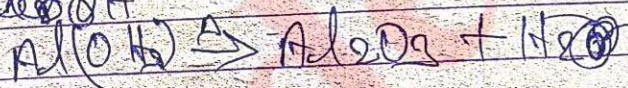
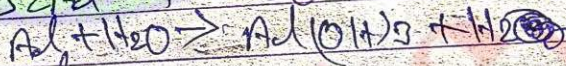
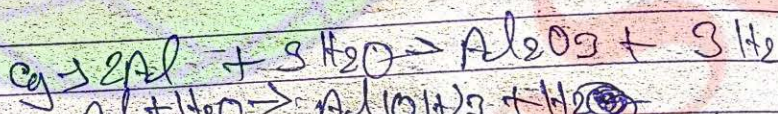
Some metals react with the cold water,



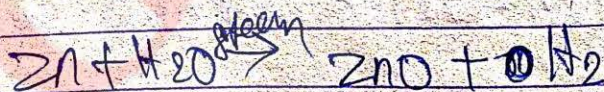
Some metals are react with hot water,



Some metals are react with steam and it produce metal oxides and water.



Due to the high temperature hydroxide of some metal like aluminum, zinc, iron immediately get decompose into oxide



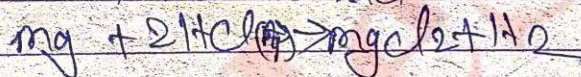
Some metals which do not react with the metal called noble metals have very low reactivity. These are gold, silver, copper, lead etc.

3) Reaction of metal with dilute acid

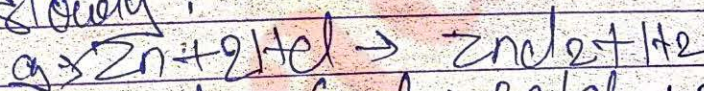
When metal react with acid form metal salt and hydrogen.



⇒ Some metals are react with acids violently or rapidly



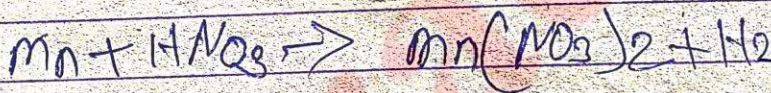
⇒ Some metals are react with acid slowly.



⇒ Some metals do not react with acid
 $\text{Cu} + \text{HCl} \rightarrow \text{No reaction}$

~~Reaction~~
 In above reaction displacement reaction is take place those metals which highly reactive than hydrogen displace it. Hydrogen which are less reactive than hydrogen does not react.

When Nitric acids react with metal no hydrogen gas is evolve but in small amount of dilute Nitric acid react with magnesium and magnesium metal and evolve hydrogen gas.



Aqua-Regia

⇒ Aqua-Regia is a mixture of 1 part of concentrated Nitric acid and 3 parts of concentrated hydrochloric acid. which makes highly corrosive

Ratio of ~~NA~~ HNO_3 and $\text{HCl} = 1:3$

In this solution gold and platinum metal can be dissolve.

Reactivity Series of metal

The arrangement of ascending and descending order of the reactivity is called reactivity series

Potassium $\rightarrow \text{K}$

Sodium $\rightarrow \text{Na}$

~~Magnesium~~

Calcium $\rightarrow \text{Ca}$

magnesium $\rightarrow \text{Mg}$

Aluminium $\rightarrow \text{Al}$

Zinc $\rightarrow \text{Zn}$

Iron \rightarrow Fe
 Zn \rightarrow Zn
 Lead \rightarrow Pb
 Hydrogen \rightarrow H

Copper \rightarrow Cu

Mercury \rightarrow Hg

Silver \rightarrow Ag

Gold \rightarrow Au

Platinum \rightarrow Pt

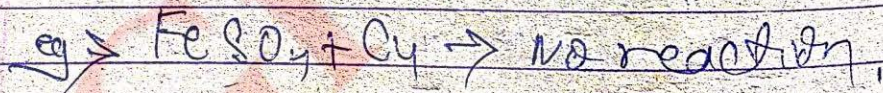


Reaction of metal with salt solution \rightarrow

A more reactive metal displace less reactive metals from its salt

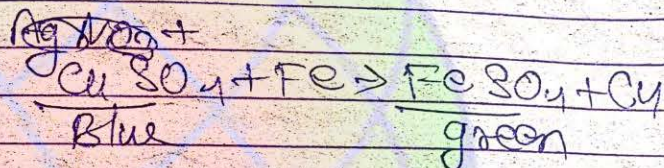


When a copper strip metal dip in a zinc sulphate no reaction is ~~occurs~~ because copper is less reactive than zinc.



* In this reaction blue colour

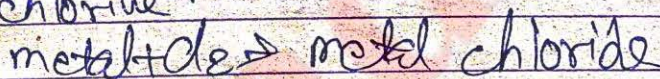
of copper sulphate turns green because high reactive metal iron copper.



In this reaction copper replace the less reactive metal silver and its colour turn from blue and a white shiny surface is also form.

⇒ Reaction of metal with a chlorine

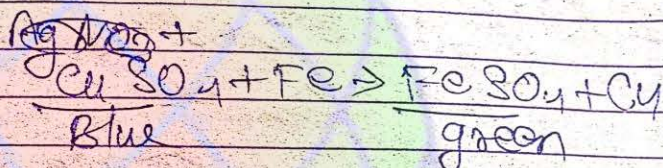
metal react with the chlorine to form its chloride.



Sodium, Calcium, Magnesium, potassium react with chlorine rapidly.



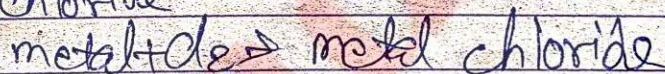
of copper sulphate turns green because high reactive metal iron copper.



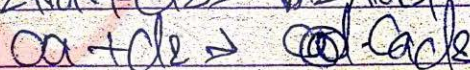
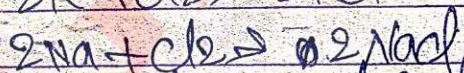
In this reaction copper replace the less reactive metal silver and its color turn from blue and a white shiny surface is also form.

⇒ Reaction of metal with a chlorine

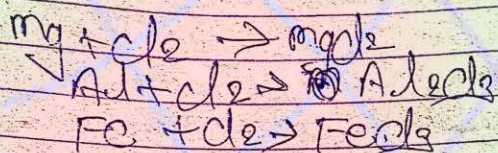
metal react with the chlorine to form its chloride.



Sodium, Calcium, Magnesium, potassium react with chlorine ~~as~~ rapidly.

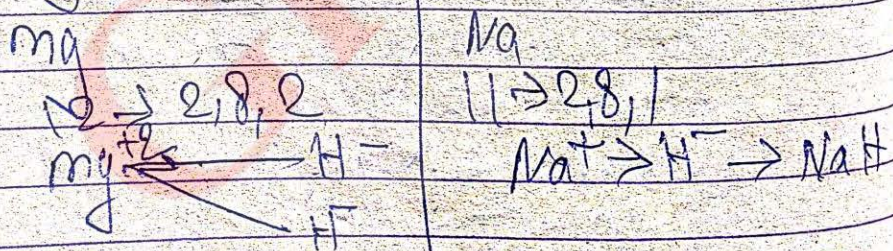
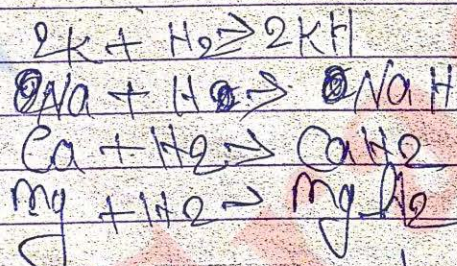


Some metal react with heating



Reaction of metal with hydrogen.

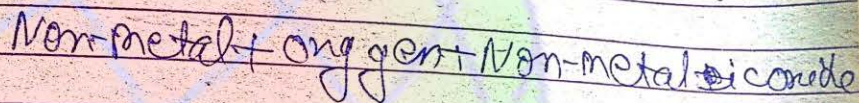
Most of the metal do not react with hydrogen only ~~some~~ reacting like sodium, potassium, calcium and magnesium react with hydrogen to form hydride.



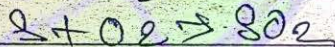
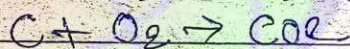
Chemical properties of Non-metal.

* Reaction of non-metal with oxygen

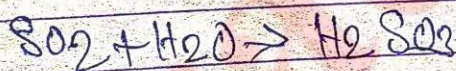
Non-metals react with oxygen to form non-metallic oxides.



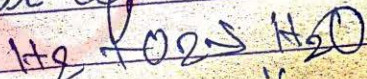
Some non-metals are highly reactive with react with room temperature.



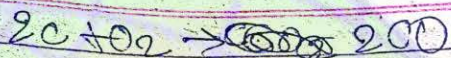
* The solution of non-metallic oxides turns ~~blue~~ litmus into ~~red~~ which shows that non-metallic oxides are ~~basic~~ acidic in nature.



* Some ~~not~~ non-metallic oxides are neutral oxides which does change the colour of litmus paper.



Hydrogen oxide is Neutral oxide



(lim. amount
of oxygen)

Reaction of non-metal with water.

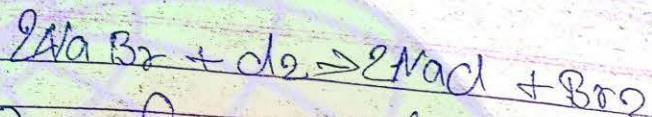
non-metal do not react with water because non-metal do not give the electrons to reduce hydrogen ions.

Reaction of non-metal with acid

Non-metal do not react with acid because non-metal can not displace H^+ ions.

Reaction of non-metal with salt solution

A more reactive non-metal displace less reactive metals to form new salt.



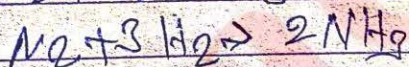
⇒ Reaction of non-metal with Chlorine

Non-metals react with the chlorine to form its chloride



∩ Reaction of non-metal with hydrogen

Non-metals react with hydrogen to form its hydride.



Q. 10

Q. write the difference ~~total~~ between ~~to~~ the chemical properties between metal and non-metals.

Uses of metal →

- i) Hydrogen is used hydrogenous oil to make vegetable ghee.
- ii) Hydrogen is used
- iii) Liquid hydrogen is used for rocket fuel.
- iv) Graphite is used as electrodes.
- v) Nitrogen is used for making ammonia, a fertilizer, food preservation,
- vi) Compound of Nitrogen like (tri

vii) Sulf

viii) Sulf

chem
br
c

→ Ca

ce
ne

i) He

ii) Ne

iii) Ar

iv) Kr

v) Xe

vi) Ra

Nuclear fission \rightarrow m.c.a. (split)
 fission \rightarrow Break

Mitro talene (TNT) is used as
 @ene clone.

vii) Sulphur is used for manufacture for
 sulphuric acid gun powder

viii) Sulphur is used for vulcanization of
 rubber.

Chemical Bonding

Chemical bonding \rightarrow The force which
 bounded the atoms or molecules is
 called chemical bonding

\rightarrow Causes of chemical bonding or chemical
 combination.

noble gas	symbol	Atomic no.	electron conf.
i) Helium	He	2	2, 0
ii) Neon	Ne	10	2, 8
iii) Argon	Ar	18	2, 8, 8
iv) Krypton	Kr	36	2, 8, 18, 8
v) Xenon	Xe	54	2, 8, 18, 18, 8
vi) Radon	Rn	86	2, 8, 18, 32, 18, 8

The atoms of all elements except the inert gas combine to the another atoms to chemical the achieve the nearest inert gas electronic arrangement and become more stable.

Another can achieve inert gas atomic arrangement for following method.

- i) By losing electrons
- ii) By gaining electrons
- iii) By sharing electrons

* On this Basis

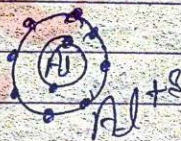
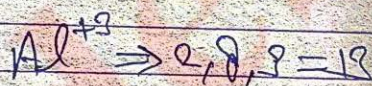
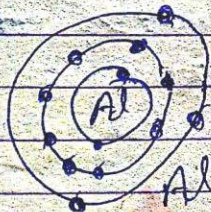
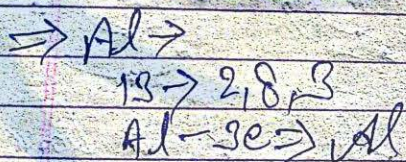
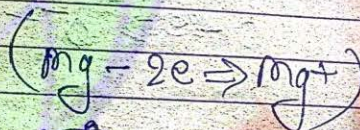
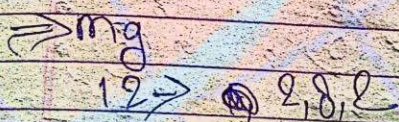
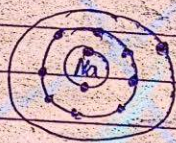
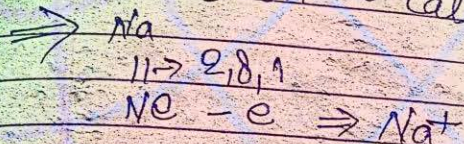
- There are two types of bond
- i) Ionic or electrovalent
 - ii) Covalent bond.

Ions \rightarrow ions in form by losing or gaining of electrons by an atom.

There are two types of ions \rightarrow

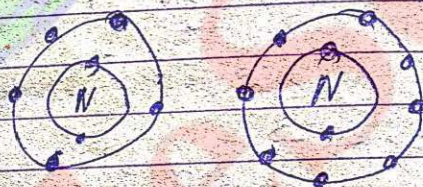
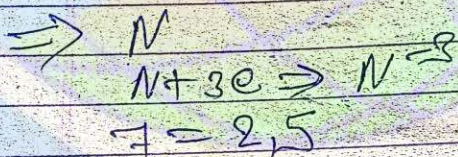
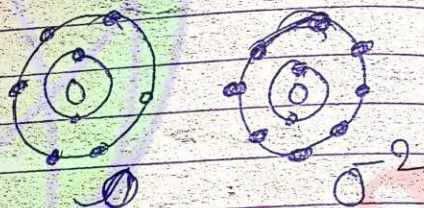
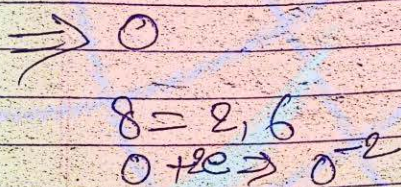
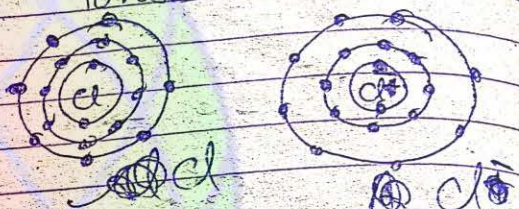
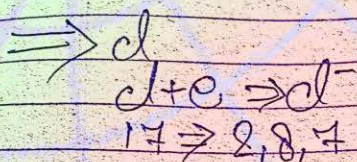
- i) Positive ions or cation
- ii) Negative ions or anion

1) ~~Cation~~ Anion is form by losing the electron is called cation.



ii) Anion is form by gaining the electron is called anion

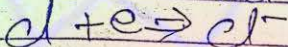
Non-metal atom use from the negative ions:



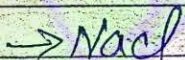
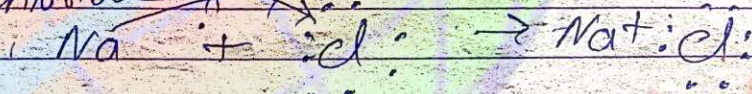
* Ionic bond \Rightarrow A bond is form by the complete transfer of ~~the~~ one electron from one atom to another atom is called ionic bond.

Ionic bond is ~~is~~ always form between two metals or non-metals.

Formation of Sodium chloride



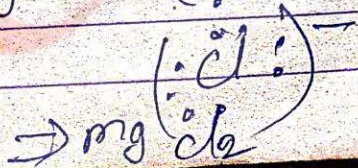
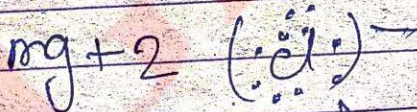
A sodium atom loses the one electron and forms the positive ion and chlorine gains the one electron from the negative ion and electrostatic force of attraction acts between them combine together to form sodium chloride.



Formation of magnesium chloride



Here two chlorines use ~~of~~ gain the two electrons lost by magnesium and form magnesium chloride.



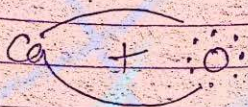
Formation of calcium oxide

Ca

20 → 2, 8, 8, 2

Ca - 2e → Ca²⁺

O + 2e → O²⁻



⇒ Properties of Ionic compounds

Ionic compounds are generally in a solid form because their atoms are combine with strong electrostatic force.

It's melting and boiling point is high

→ It is soluble in water but in solution in organic solven like alcohol or begin corrosion, CaCO₃, or sulphate, Ionic compounds are good conducter of electricity in a molten state or solution for because it project

* covalent bond \rightarrow A chemical bond form by one sharing of electron between two atoms is known as covalent bond.

There are three types of co-valent bond.

- i) Simple covalent bond
- ii) double covalent bond
- iii) triple covalent bond

i) ~~Simple~~ Single bonds A covalent bond form by sharing of one pair of electrons is called ~~single~~ single covalent bond. It is denoted by a single line (-)



ii) double covalent bond \rightarrow A covalent bond form by sharing of two pair of electron is called double covalent bond. It is denoted by double line (=)

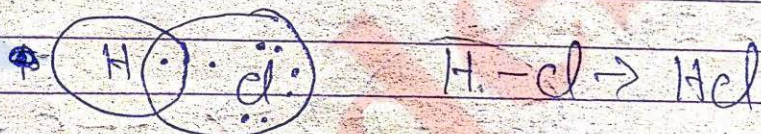


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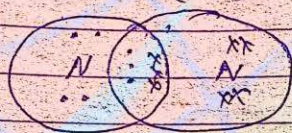
i) ~~Single bond~~ Single bond \rightarrow A covalent bond form by sharing of one pair of electrons is called ~~single~~ single covalent bond. It is denoted by a single line ($-$)



ii) Double covalent bond \rightarrow A covalent bond form by sharing of two pair of electron is called double covalent bond. It is denoted by double line ($=$)



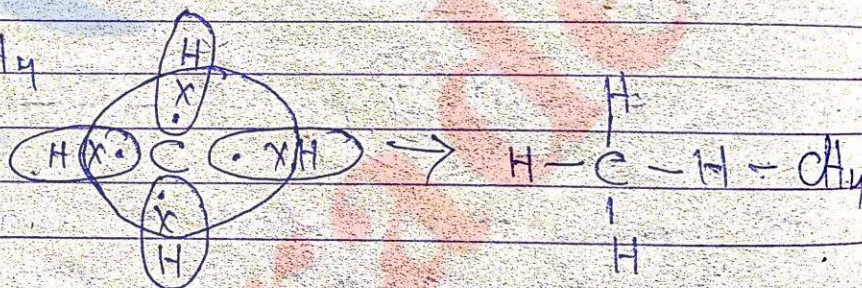
iii) Triple covalent bond \rightarrow A covalent bond is formed by sharing of the three pairs of electrons is called triple covalent bond. It is denoted by triple line (\equiv)



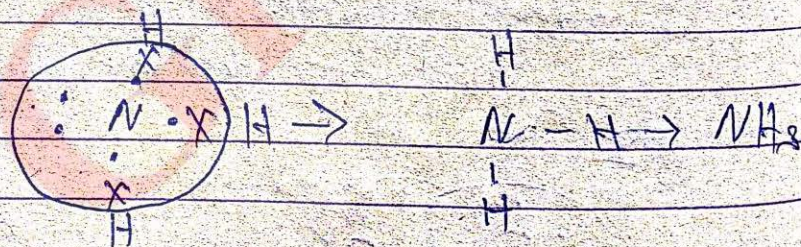
* Triple covalent bond is weaker covalent bond.

* Single covalent bond is stronger than double covalent bond.

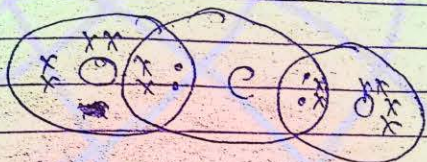
* CH_4



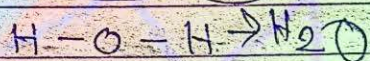
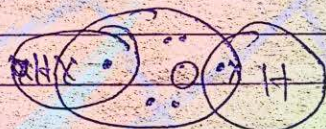
* NH_3



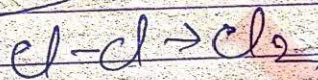
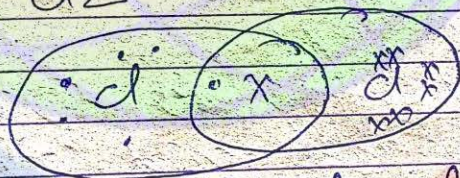
* CO_2



* H_2O



* Cl_2



Co-valent bond is a way from between two or more non metallic atom.

* Co-valent compound-

The compound which contain covalent bond is called co-valent compound

Ex $\rightarrow HCl, N_2, O_2,$

$H_2O, CH_4, C_6H_{12}O_6$

urea \rightarrow CBr₄ \rightarrow carbon tetra bromine

* Properties of co-valent compound

- i) Co-valent compound usually existing three forms \rightarrow i) solid, ii) liquid, iii) gases
- ii) at melting and boiling point is low
- iii) co-valent compound are usually insoluble in water but soluble in organic solvent like acetone, alcohol, benzene etc.

iv) Co-valent compound do not conduct ~~and~~ electricity.

Q \rightarrow Write the difference between Ionic compound and co-valent compound

P01 = 156

Occurrence of metals

metals are occurs free as well as combined in state. free as well as
↳ Outcrust is the major source of the metals. Only few less reactive like platinum are found in free state like copper, silver, gold

(iii) Some metals are reactive metals are found in a ~~com~~ combined state.

(iv) Sea water is also the source of the metals

→ Minerals

The natural materials in which the metal or their compounds are found in the earth ~~is~~ are called minerals.

Ores

The ~~so~~ minerals from which the metals ~~so~~ can be extracted profitably are called ores.

All ores are the minerals but all

metals are not ores

minerals are not a ores.

Types of ores :-

1) Sulphide ores → The ores which contain sulphide called sulphide ores.

eg →

Name of metals	chemical formula	Name of ores
----------------	------------------	--------------

lead	PbS	galena
copper	Cu ₂ S CuFeS ₂	copper glance copper pyrites
mercury	HgS	cinnebar
zinc	ZnS	zinc blende

⇒ Oxide Ores

Those ores which contain oxide of the metals is called oxide ores.

eg → Aluminium

Name of metal	chemical formula	name of ores
Al	Al ₂ O ₃ · 2H ₂ O	Bauxite
Fe	Fe ₂ O ₃	Hematite
Cu	Cu ₂ O	Cuprite

⇒ Carbonate ores.

These ores which contain the carbonate of the metal called the carbonate ores.

in	Named metal	chemical formula	Named ores
↘	Zn	ZnCO ₃	calamine
↘	Ca	CaCO ₃	lime stone

⇒ Halide ores

The ores of the metal which contain also halide elements like iodine, chlorine, bromine etc

	Named metal	Chemical formula	Named ores
↘	Na	NaCl	Rock salt
↘	Al	MgAlF ₆	cryolite

Gangue

Gangue \rightarrow The unwanted earthy material present in ores is called gangue.

Metallurgy

The process of extraction of pure metal from their ores is called metallurgy.

There are many steps in a metallurgy process.

i) Concentration of ore (Enrichment of ores)

ii) Conversion of concentrated ore into metal.

iii) Refining of impure metal.

\Rightarrow Concentration of ores (Enrichment of ores)

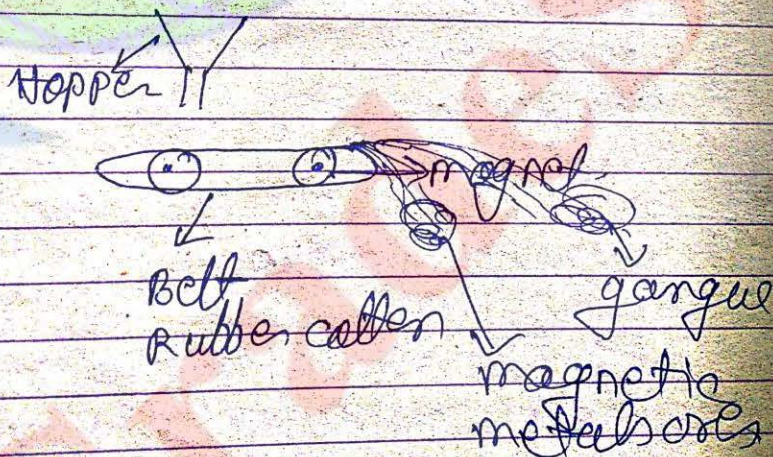
~~There are many methods for the concentration of the ore~~

The process of removal of unwanted earthy material from

an. ores is called Concentration of ores
on the basis of the nature of ores
they are many method used for the
Concentration of ores.

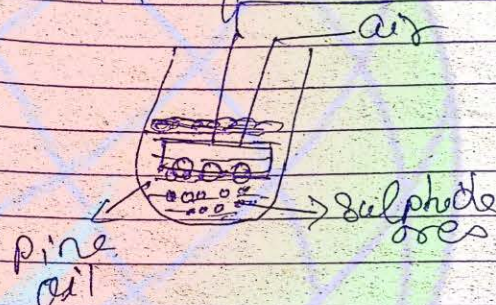
I) hydraulic washing → By this method
lighter gain particles are washed
away when the stem or water
passed over the crust ores.

II) magnetic separation → In this method
magnetic ores like hematite can
be concentrated.



III) ~~Flotation~~ Froth floatation method →
This method is used for concentrating

The sulphide ores when the crust in the



When the crust of the powder mixed with water & mixture of pine oil.

When air is blown froth is produced and carry the sulphide ores and rises it on the upper surface.

→ Conversion of concentrated ore into metal

For the extracting of metal from concentrated ores are divided on the basis of reactivity into its three types →

i) metal of highly reactivity or highly reactive metal

ii) moderate reactive metal

iii) less reactive metal.

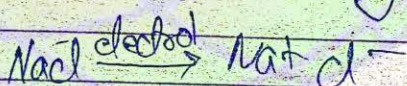
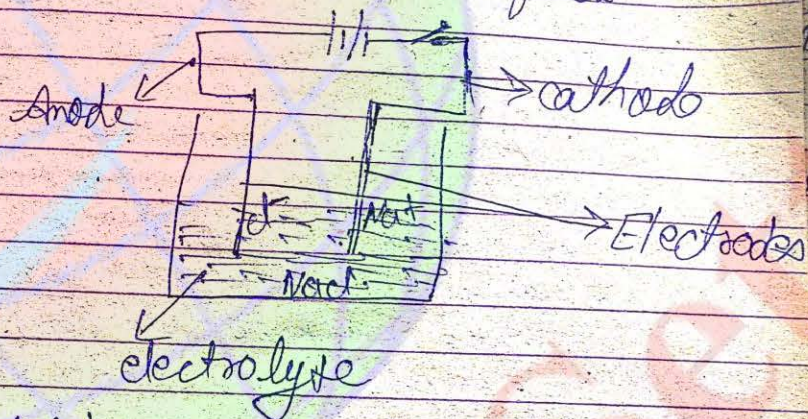
y Extraction of highly reactive metals.

highly reactive metals like Ca , potassium, magnesium, and aluminium are extracted by the electrolysis process.

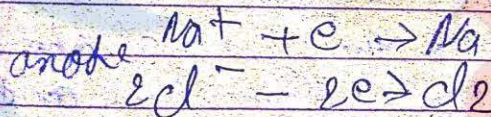
e-
as
h's
sally

Highly reactive metals: →

In the electrolysis process molten form of the ionic chloride oxides are used as a electrolytes and or salt of ionic.



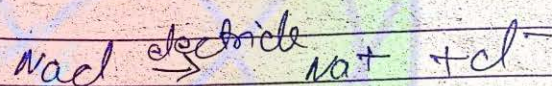
cathode



And two electrodes in which one is made up of pure metals which is used as cathode and second electrodes which is made up of a pure metals.

when electricity passes through then pure metal is obtained at the cathode.

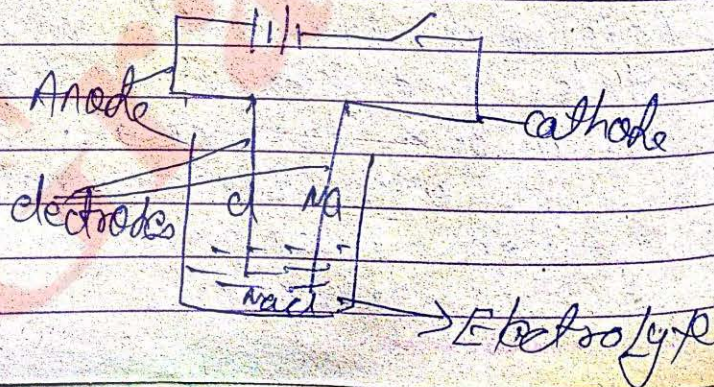
↓ Extraction of Sodium chloride →
 when electricity is passed through
 the solution or molten form
 of sodium chloride it get dissociated
 into Na^+ or Cl^-



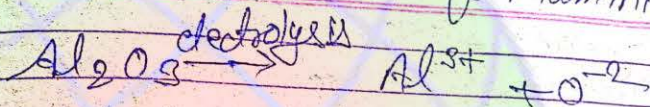
At cathode Positive sodium ions
 are attracted to the negative electrode
 (cathode) where it gain
 electrons and get reduced into
 sodium atom.



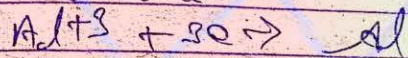
At anode negative ion chloride
 are attracted to the positive
 anode where it loses the
 electrons and form
 Chlorine gas



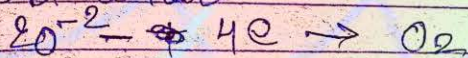
Y Electrolysis of Aluminium metal



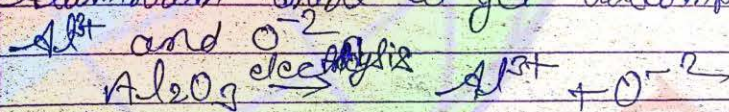
At cathode



At anode

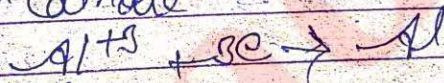


When electricity passes through the aluminium oxide it gets decomposed



Aluminium plus three ions (Al^{3+}) attracted to the cathode where it gains the electrons and gets reduced into aluminium atoms.

At cathode



At anode

Oxygen ions attracted to the anode where it loses the electrons and gets oxidized into oxygen ions (oxygen gas (O_2))

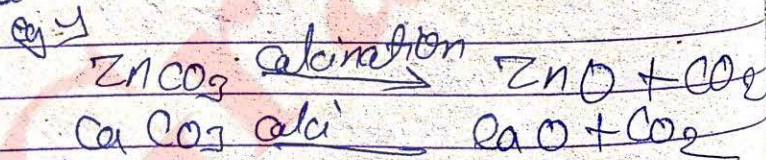
The metals obtain by the electrolysis process is near about ninety-nine / i.e. 99% is pure so their is no further requirements to purify it.

↳ Extraction of moderated reactive metals:→

The moderated reactive metals concentrated ores oxidise converted its oxide form by following two methods

- i) calcination
- ii) Roasting

↳ calcination → The process of heating carbonate ore in the absence of air to convert into metal oxide is called calcination.



ii) Roasting → The process of heating

Sulphide
(ore)

Zn

The
calc
req

↳

The
the
alu

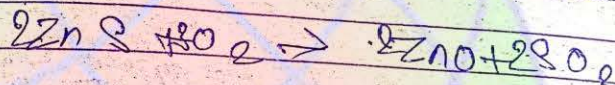
Re

Zn

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Co
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Sulphide ore in the presence of air (oxygen) is called roasting.



The metal oxide obtain by the calcination or roasting of ores to required to reduce into the metal.

→ Reduction of metal oxide

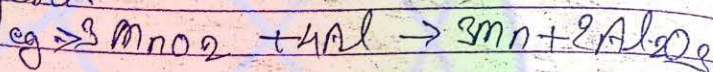
The metal oxides are reduced by the reducing agent like carbon, aluminium, sodium, calcium,

• Reducing metal oxide with carbon

The oxide of less reactive like zinc, iron, nickel, copper, tin, lead are reduced by the carbon (coke) when metal oxides mixed with coke and heated in furnace then metal oxide get reduced into metal.



Some metal oxides can not be reduced by coke that metal oxides are reduced by more reactive reducing agent.



Thermite reaction \rightarrow

The reduction of a metal oxide to form metal by using aluminium powder as reducing agent is called thermite reaction.

This reaction is highly exothermic reaction produce large amount of the heat which melt the metals and produce the metal in molten state. Due to this property this is use in thermite welding for joining the broken iron ~~rod~~ filling.

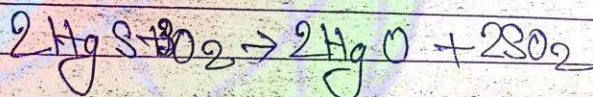


Extraction of less reactive metal \rightarrow

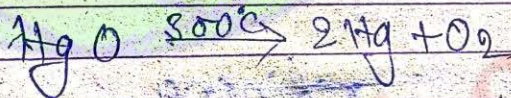
less reactive metals can be reduced by ~~following~~ heating the its oxide along.

When the ~~ore~~ sulfide oxides like mercury heated in the presence of the air this process is called roasting.

we get mercury oxide ~~HgO~~

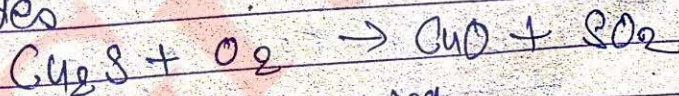


ii) On heating the mercury oxide at 300°C it get reduce in a mercury



Extraction of Copper

When concentrated copper sulphide is roasted it get converted into its oxides



In a furnace ^{remaining} copper sulphites react with the copper oxides to form

copper

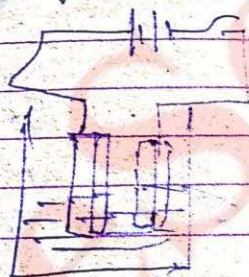


* Refining of metals \rightarrow

The metal obtain by the various process contain some impurities they require to refined it.

* There are many method for refining the metals among this electrolysis is most important evidently used process \rightarrow

Electrolytic refining



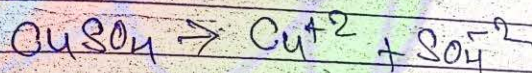
Electrolytic refining of copper

For refining the copper metal the apparatus apparatus are set up as shown in the figure, & thicker ~~an~~ impurity

side of copper anode and a thinner is connected at the is used as a cathode. pure rod of metal

Copper sulphate and small amount of the dilute sulphuric acid solution is used as an electrolyte

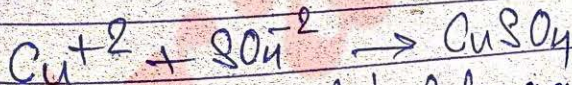
After passing the electric current through it then copper sulphate get broke



Cu^{+2} ions get attracted towards the cathode where it gain electron and get reduce in a copper



SO_4^{-2} get attract towards the anode when it combined to the copper

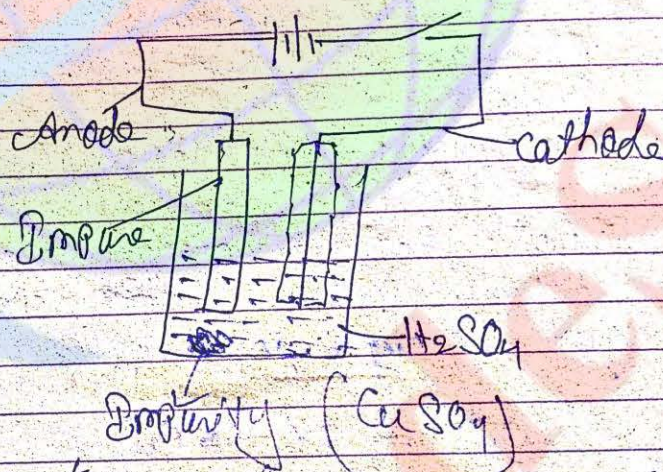


This copper sulphate again dissolve in a electrolytes and this process is repeated again and again then thickness of the impure



anode metals get ~~decrease~~ decrease
pure cathode metals get
decrease.

Just below the anode
Impurities that in mud etc is
found out.



Flow chart of the refining.

Q what

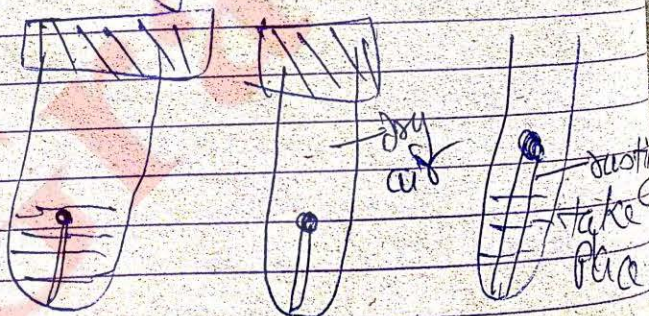
The process of the removal of the unwanted impurities from the ores and after that obtain ores is called concentrated ore.

⇒ Corrosion

The feathering or removal of the layer of the metals by air, moisture, acid etc. is called corrosion.

⇒ Rusting

Corrosion in Iron metal is called rusting.



Fe

Fe²⁺
Fe³⁺

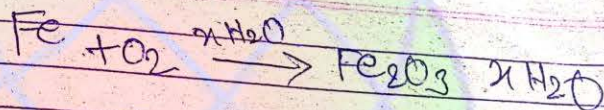
to see
1) Process
2) Process

Q How
moist
iron
Ans. For
and
first
see

and

air

only
this
are
test



- For the rusting of the Iron there are necessary conditions are required:
- i) Presence of air (oxygen)
 - ii) Presence of moisture (for water)

Q How to show that the air and moisture are required to rusting the iron?

Ans For this experiment take the three test tube and put one Iron nail in each in a first tube nail is fully dip in water. Second test tube nail completely placed in a dry air and third nail is placed in third test tube as water as well as moisture, air is present.

After the one week observe that only the iron nail placed in the third test tube get rusted.

But another nail placed in other test tube do not rust. So for the

rusting moisture and air both are required.

⇒ Prevention of rusting

i) By painting → Paint apply on the surface of the iron to prevent it contact from air and moisture and protect from the rusting.

ii) By using Applying grease and oil.

Grease and oil also prevent the contact from the air and moisture from metals.

iii) By galvanization

⇒ The process of putting a layer of the zinc on iron metal is called galvanization.

Zinc metal does not oxidized with the air or moisture that's why It is used as a thin layer on iron metals.

iv) By tin plating or chromium plating

chromium plating and tin plating

resist the corrosion
v) By making alloys.

Alloys of the metals are less corrosive than (iron) metal. i.e. in a large amount of the alloy is used to make the surgery equipments, laboratory equipments.

Corrosion of Aluminium

When aluminium metal is exposed in air or moisture it gets dull shiny due to the formation of a thin layer of aluminium oxides which further prevents the corrosion. ~~that~~ we can say that the corrosion of aluminium is beneficial.

Corrosion of Copper

The ~~color~~ shine of the copper gradually gets dull due to the formation of copper carbonate which is in green in colour.

green colour is mixture of
 $CuCO_3 \cdot Ca(OH)_2$
green