

ACID, BASES & SALTS

• acidus \rightarrow sour

• bitter in taste and soapy in texture

EXP: -

- coffee is bitter but acidic
- Amino acid tastes bitter, sour, & sweet.

INDICATORS

indicator	acidic medium	basic medium
litmus paper	blue-red; red-red	Red-Blue; Blue-Blue
Turmeric	Yellow	Red
Hydrangea flower	Blue	Pink
Phenolphthalein <small>(colourless)</small>	Colourless	Pink
methyl orange <small>(orange)</small>	Red or pink	Yellow



OLFACTORY INDICATORS: some substances whose odour change in acidic and basic media. Eg: onion, vanilla extract, clove etc.

Acid: acids are substances that give H^+ ions in water.

organic acid

Anorganic acids

Natural sources	acids
vinegar	acetic acid (CH_3COOH)
orange	citric acid
Tamarind	Tartaric acid
Tomato	Oxalic acid
sour milk (curd)	Lactic acid
Lemon	citric acid
Ant sting	methanoic acid
Nettle sting	same Formic acid

- HCl
- H_2SO_4
- HNO_3
- H_2CO_3

Physical property of acids:-

1. Physical state:

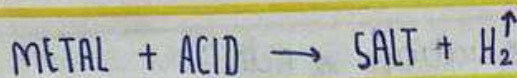
• H_2SO_4 - liquid • citric acid - solid (room temp) • HCl - gaseous.

2. Corrosive in nature

3. Sour in taste

CHEMICAL PROPERTIES OF ACIDS:

1. Reaction with metals:

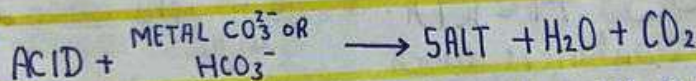


Eg: $Zn + HCl \rightarrow ZnCl_2 + H_2 \uparrow$
⇒ displacement reactⁿ
⇒ exothermic reactⁿ
⇒ redox reactⁿ.

ACTIVITY:
reaction: $Zn + H_2SO_4 (dil) \rightarrow ZnSO_4 + H_2 \uparrow$
observation:
1] bubbles are formed in soap solⁿ
2] gas burns with pop sound.

• Effervescence:- evolution of gas from a salt in form of bubbles along with fizzing & foaming.

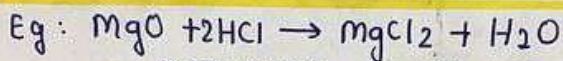
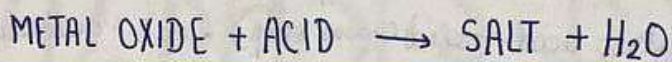
2. Reaction with metal carbonates/bicarbonates.



Eg: $CaCO_3 + CH_3COOH \rightarrow (CH_3COO)_2Ca + H_2O + CO_2$
 $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$
 $MgCO_3 + HCl \rightarrow MgCl_2 + CO_2 + H_2O$

Reaction: $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 \downarrow + H_2O$. [lime water test]
passing excess CO_2 : - (white)
 $CaCO_3 + H_2O + CO_2 \rightarrow Ca[HCO_3]_2 (aq)$.

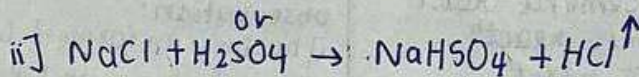
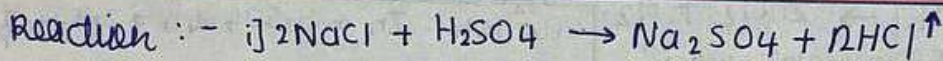
3. Reaction with metal oxides.



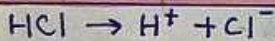
metal oxides \rightarrow are basic in nature
 non metal oxides \rightarrow are acidic in nature

Role of water in dissociation of acid:

ACTIVITY: -



observation: - when we pass HCl gas through dry litmus paper it does not change any colour but it does with moist litmus paper. conclusion: acid show acidity with H_2O .



ARRHENIUS ACID:

acid are those substances which give H^+ ions when dissolved in H_2O .

base: are those substances which give OH^- ion when dissolved in H_2O .

\Rightarrow increase in concentration of H_3O^+ ion.

ACTIVITY:

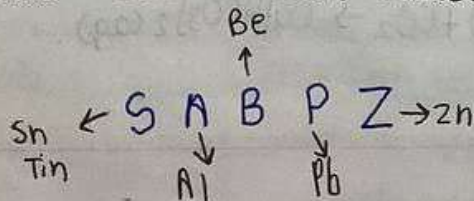
aim: to show acid can conduct electricity

observation: i] bulb glows in dil HCl and H_2SO_4 .

ii] bulb does not glow in glucose & alcohol.

conclusion: - aqueous solⁿ of all acid contains ions.

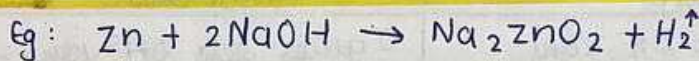
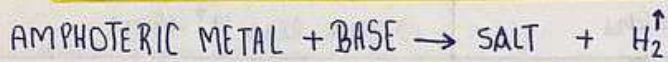
Amphoteric metals: - can react with acid & base both.



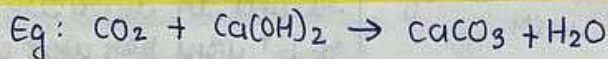
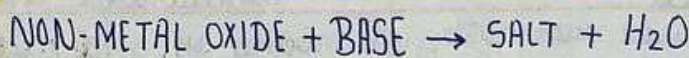
[Sab padho bano zanab]

Chemical properties of Bases:

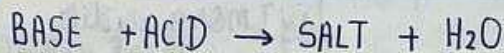
i] Reaction with metals:



ii] Reaction with non-metal oxides:

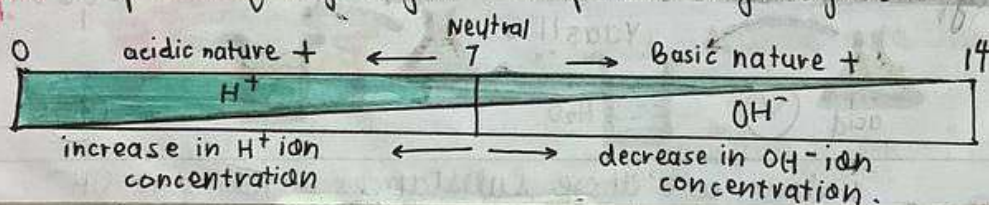


iii] Reaction with acid:



neutralisation reaction.

pH: power of Hydrogen or potenz hydrogen.



importance of pH in everyday life?

self defence by plants & animals.

↓
when we are stung by a bee we feel irritation due to formic acid.

↓
Leaf of nettle plant & dock plant.

tooth decay

↓
pH of mouth is more than 5.5 but when it gets lower than that, mouth becomes acidic.

↓
Brush (toothpaste).

digestion

↓
HCl is produced in stomach when too much HCl increases causing acidity.

↓
i] antacids
ii] eno
iii] Mg(OH)_2 milk of magnesia.

acid rains

↓
 $\text{NO}_2 + \text{H}_2\text{O}$

↓
 HNO_3

↓
 $\text{SO}_2 + \text{H}_2\text{O}$

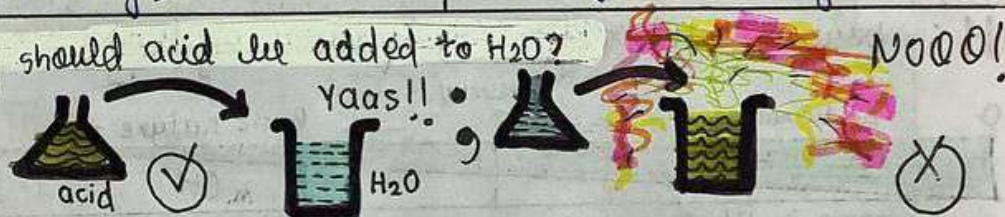
↓
 H_2SO_4

acid!

Strong acid	Weak acid
⇒ those acid which are completely ionize in water.	⇒ those acids which partially ionize in water.
⇒ give more H^+ ions	⇒ give less H^+ ions
strong base	Weak base
⇒ give more OH^- ions.	⇒ gives less OH^- ions in water.

Dilute acids	concentrated acid.
i] mixing an acid with water results in decrease in conc ⁿ of H^+ ions per unit vol ^m .	i] mixing an acid with water results in increase in conc ⁿ of H^+ ions per unit vol ^m .
ii] Less corrosive	ii] more corrosive
iii] Less reactive	iii] more reactive
iv] lower acidity (less intensity)	iv] more acidity (great intensity)

• why should acid be added to H_2O ?



Base : Bases are those substances which give OH^- ions when dissolved in H_2O .

Physical Properties

- i] Taste & Texture : Bitter & soapy.
- ii] corrosive in nature : (strong bases) $\rightarrow NaOH, KOH, Ca(OH)_2$
- iii] electrical conduction :

* **ALKALI** : a water soluble base.

⇒ all alkali are bases but all bases are not alkali

Salt: a salt is an ionic compound that can be formed by the neutralisation reaction of acid & base.

① **Common Salt:**

• Sodium chloride
NaCl

• Sources of common salt

→ seawater
→ Inland lakes

⇒ Rock salt: Pink because of impurities.

• uses of common salt:

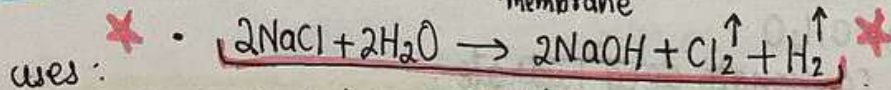
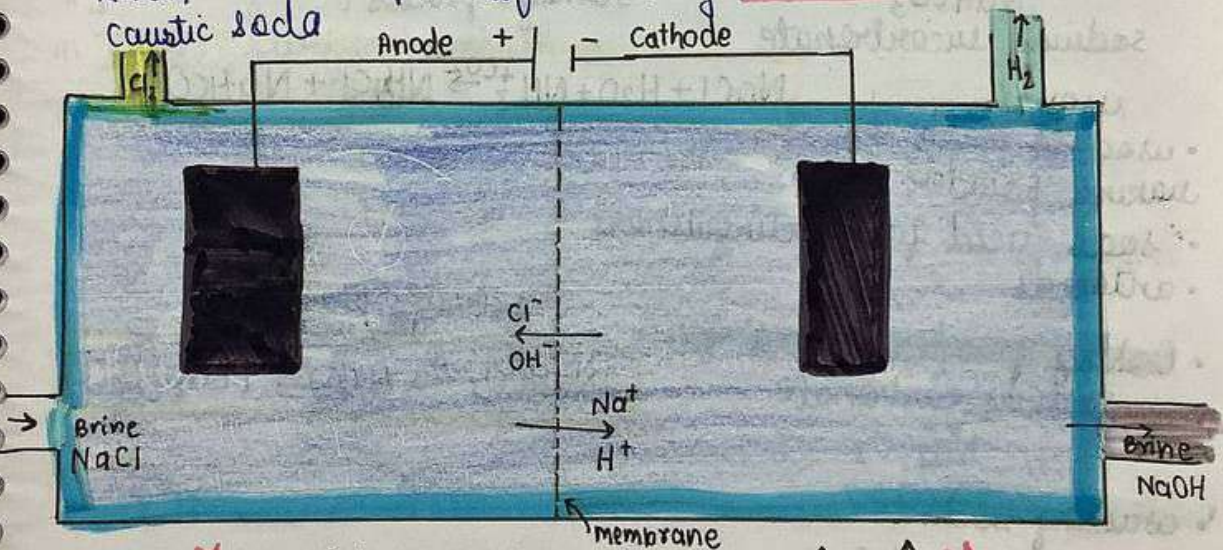
- i] used in making large no. of chemicals
- ii] cooking
- iii] preservative
- iv] manufacture of soap.

⇒ brine :- $\text{NaCl} + \text{H}_2\text{O}$

• Sodium hydroxide

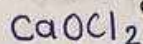
NaOH
caustic soda

* manufactured by - chlor-alkali process.



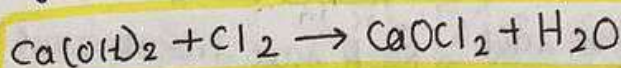
- H_2 → fuels, margarine, ammonia for fertilizers
- Cl_2 → water-treatments, swimming pools, disinfectants, pesticides
- NaOH → de-greasing metals, soap, detergent, paper etc

Bleaching powder



⇒ calcium hypochlorite or calcium oxychloride.

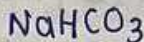
- The Cl_2 gas formed by chlor-alkali process is processed with dry slaked lime to produce CaOCl_2 called Hasenclever plant.



uses: -

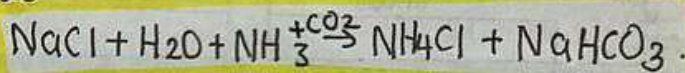
- used in textile industries for bleaching cotton and linen.
- bleaching wood pulp.
- oxidising agent in chemical industries
- disinfecting water.

Baking soda



sodium bicarbonate

Solvay's process

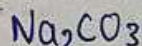


uses: -

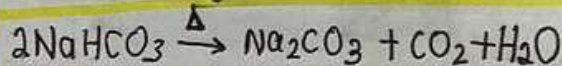
- used to make baking powder.
- soda-acid fire extinguishers.
- antacids.

Baking powder / Soda Ash

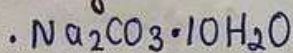
sodium carbonate



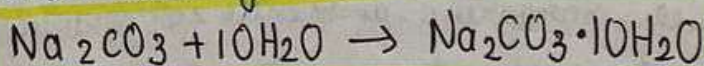
Solvay's process



washing soda.



sodium carbonate decahydrate.

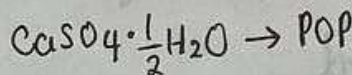
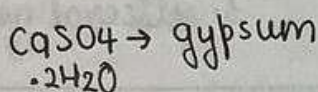
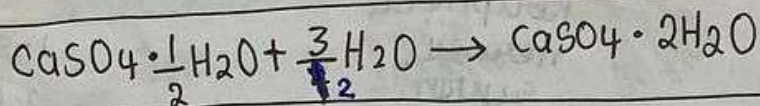


* water of crystallisation: is the fixed number of water molecules present in one formula unit of salt. *

uses:

- i] glass, soap & paper industries
- ii] borax
- iii] cleaning agent
- iv] removing hardness of water.

PLASTER OF PARIS



uses:-

- i] setting fractured bone
- ii] making toys and decorative items
- iii] make surface smooth.