ACIDS, BASES AND BUFFERS

Acids, Bases are defined by Four main theories

1. Traditional theory / concept
2. Arrhenius theory
3. Bronsted and Lowry theory
4. Lewis theory

GENERAL CONCEPT :

- Acid: **are the substance**
- **Which converts blue litmus paper to red**
- **Having the PH <7**
- **Sour taste**
- **React with bases to form salts and**
- **water**
- **Eg :- Hydrochloric acid (*HCl*)**

BASE

- Base: **are the substance which converts red litmus paper to blue**
- **Having the PH >7**
- **Bitter taste**
- **React with Acids to form salts and water**
- **Eg: Sodium Hydroxide (NaOH)**

ARRHENIUS THEORY

- In 1884 of Svante Arrhenius Also known as, Arrhenius theory of ionization
- b)Electron dissociation theory
- This theory define acids & bases according to there formation of ions when dissolved in water

ACIDS

- **An Acid is a substance that can release hydrogen ion (H+) when dissolved in water or A substance which when dissolved in water gives hydrogen ions (H+) is known as acid**

- Hydrochloric acid (**HCl**)

BASE

- **A Base is a substance that can release a Hydroxyl ion (OH-) when dissolved in water Or A substance which when dissolved in water gives Hydroxyl ion (OH-)is known as acid**

- Eg : Sodium Hydroxide [NaOH (Na+ **+** OH)]

NEUTRALIZATION REACTION

- Acids react with Base and form Salt & Water
- Eg: Hydrochloric acid react sodium hydroxide and form Sodium chloride (Salt) & water

$$NaOH + HCl = NaCl + H_2O$$

(BASE) + (ACID) = (SALT) + (WATER)

LIMITATIONS

- Water is essential
- Not explain Acidity or Basisity of non aqueous Solvent Eg :Benzene
- Basisity of Ammonia (No OH- ion) is not explained
- Acidity of BF_3,$AlCl_3$ (No H+ ion) is not explained

Boric Acid

Hydrochloric acid

Strong ammonium hydroxide

Calcium hydroxide

Sodium hydroxide

Boric Acid

(H_3BO_3 / 61.83)

Syn- Orthoboric Acid, Aecidium boricum

Preparation :-

Borax with Sulphuric acid in presence of water

$$Na_2B_4O_7 + H_2SO_4 + 5H_2O = 4H_3BO_3 + Na_2SO_4$$

PROPERTIES

Physical Properties:

- White crystalline powder
- Odourless
- Soluble in water
- Soluble in Ethanol
- Soluble in glycerine

Uses of Boric Acid

- Local anti-infective
- To maintain acidic pH medium in Medicament
- Preparation of buffer solution
- In ophthalmic preparation
- Dusting powder
- Preparation of ointment

HYDROCHLORIC ACID
HCL / 36.46

Syn: spirit of salt, muriatic acid, acidium hydrochloricum

Preparation :-

Conc.Sulphuric acid react with sodium chloride

$$NaCl + H_2SO_4 = HCl + NaHSO_4$$

PHYSICAL PROPERTIES

- Clear colorless liquid
- Pungent odour
- Miscible with water
- Miscible with alcohol
- fuming liquid

Uses

- As a Pharmaceutical Aid (Acidifying agent)
- Solvent in Industry
- For Manufacturing of Basic Pharmaceuticals
- Reagent in Laboratory

STRONG AMMONIUM HYDROXIDE NH3 / 17.03

Syn: Ammonia solution, ammonium hydroxide, strong ammonium water, liquor ammoniae forties

Preparation:-

By mixing ammonium chloride with slaked lime

$$NH_4Cl + Ca(OH)_2 = NH4OH + CaCl_2$$

PHYSICAL PROPERTIES

- Clear colourless liquid
- Pungent odour
- Characteristic taste
- Miscible with water
- Aqueous solution is strongly
- Alkaline in nature

USES

- Alkalizing agent
- Reflux stimulant (fainted person)
- Vasoconstrictor
- Strong base
- Antacid
- Reagent in Laboratory

Calcium hydroxide (Ca(OH)2 / 74.10)

Synonym: Slaked Lime, Lime water

Preparation:- By treating calcium chloride with sodium hydroxide

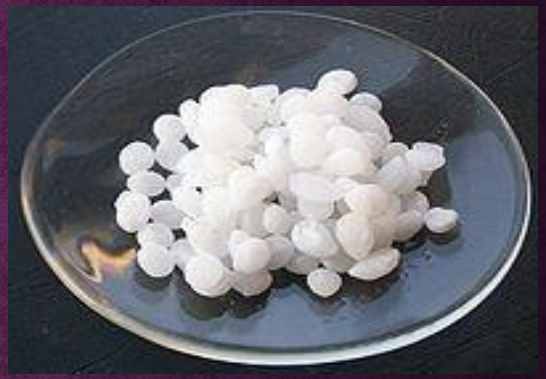
$$CaCl2 + 2NaOH \; Ca(OH)2 + 2NaCl$$

Physical Properties: White amorphous powder, Slight bitter taste, Slightly soluble in Water, Insoluble in Alcohol & soluble in Glycerin

USES

- Antacid
- Astringent
- Fluid electrolyte
- Emulsifying agent
- Absorb carbon dioxide
- Making of glass
- White washing of cloth

SODIUM HYDROXIDE (NAOH / 40)



Syn: Caustic soda, soda lye

Preparation:

By treating sodium carbonate with lime water

$$Na_2CO_3 + Ca(OH)_2 = 2NaOH + CaCO_3$$

Properties :-

White amorphous pellets, Slight bitter taste, Soluble in water, Soluble in alcohol, Soluble in glycerine & Deliquescent in nature

USES

- Alkalizing agent
- Disinfectant for animal houses
- For preparation of soap
- Absorb CO_2 gas
- Common laboratory reagent

THANK YOU

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