CHEMISTRY

DINESH TUTORIAL
Creating excellence

Board – CBSE	Class – 10th	Topic – Acids, Bases and Salts

INDICATORS

- **Natural** E.g, litmus
- **Olfactory** E.g,onion
- **Synthetic** E.g, phenolphthaler

Indicator	Colour in Acid	Colour in Alkali
Litmus	Red	Blue
Methyl orange	Pinkish red	Yellow
Phenolphthalein	Colourless	Pink

pH Scale

Scale for measuring hydrogen ion concentration in a solution
For acidic solution, pH < 7
For neutral solution, pH =7
For basic solution, pH > 7

CHEMICAL SUBSTANCES

ACIDS

Based on strength of H^+

- **Stong acids** E.g, HNO_3, H_2SO_4, HCl,etc
- **Weak acids** E.g., HCOOH, CH_3OOH, etc

Physical Properties

Taste sour
Soluble in water
All dilute acids conduct electricity
Change blue litmus to red

Types

- **Organic Acids**: Acid produced by plants and animals, e.g.,HCOOH, CH_3COOH,etc
- **Mineral Acids**: Acid prepared from minerals presents in earth's crust, e.g., HCl, H_2SO_4,etc

Chemical Properties

- Taste bitter
- Feel slippery to skin
- Some bases are water soluble, e.g., sodium hydroxide, potassium hydroxide
  These are called alkalis
- Change red litmus to blue

Reaction with Metals

Metal + Acid ⟶ Salt + Hydrogen gas
$Zn(s) + H_2SO_4(aq) \longrightarrow ZnSO_4(aq) + H_2(g)$

Reaction with Hydrogencarbonates

Metal hydrogencarbonate + Acid ⟶ Salt + Carbon dioxide + Water
$NaHCO_3(s) + HCl(aq) \longrightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

Reaction with Metal Carbonates

Metal carbonate + Acid ⟶ Salt + Carbon dioxide + water
$Na_2CO_3(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

Reaction with Metallic Oxides

Metal oxide (base) + Acid ⟶ Salt + Water
$CuO(s) + 2HCl(aq) \longrightarrow CuCl_2(aq) + H_2O(l)$

BASES

Based on strength of OH^-

- **Strong bases** E.g., NaOH, KOH,etc
- **Weak Bases** E.g., $Mg(OH)_2$, NH_4OH,etc

Physical Properties

- Taste bitter
- Feel slippery to skin
- Some bases are water soluble, e.g., sodium hydroxide, potassium hydroxide
  These are called alkalis
- Change red litmus to blue

Chemical Properties

Reaction with Metals

Metal + Base ⟶ Salt + Hydrogen
$Zn(s) + 2NaOH(aq) \longrightarrow Na_2ZnO_2(aq) + H_2(g)$

Reaction with Non-metallic oxide

Non-metallic oxide + Base ⟶ Salt + Hydrogen
(Acidic)
$CO2(g) + 2aOH(aq) \longrightarrow Na_2CO_3(s) + H_2O(l)$

Salts

Formed by neutralisation reaction

Acid + Base ⟶ Salt + Water
HA + MOH ⟶ MA + HOH
$NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l)$
$HNO_3(l) + KOH(aq) \longrightarrow KNO3(aq) + H_2O(l)$

Important Compounds	Chemical name	Chemical formula	Preparation	Uses
Common Salt	Sodium chloride	NaCl	By combination reaction of sodium hydroxide and hydrochloric acid $NaOH(ag) + HCl(ag)$ ↓ $NaCl(ag) + H_2O(0$	(i) As raw material for making many chemicals (ii) In cooking food
Caustic Soda	Sodium hydroxide	NaOH	By passing electricity through concentrated sodium chloride (brine) solution $2NaCl(ag) + 2H20$ (l) ↓ $2NaOH(ag) + Cl_2(g) + H_2(g)$	(i) In detergents and soaps (ii) In paper making (iii) In bleach manufacture (iv) In bauxite purification to extract aluminium
Washing Soda	Sodium carbonate decahydrate	$Na_2CO_3.10H_2O$	By recrystallisation of sodium carbonate in water $Na_2CO_3 + 10H_2O$ ↓ $Na_2CO3 . 10H_2O$	(i) Softening hard water (ii) In washing clothes (iii) In paper, paint and textile industry (iv) Manufacturing glass, borax and caustic soda extract
Baking Soda	Sodium hydrogen carbonate	$NaHCO_3$	On reacting cold concentrated sodium chloride (brine) solution with ammonia and carbon dioxide $NaCl + NH_3 + CO_2 + H_2O$ ↓ NaHC03 + NH4Cl	(i) Preparing baking powder (ii) Manufacture of soda water (iii) In fire extinguishers (iv) As an antacid in medicine
Bleaching Powder	Calcium oxychloride	$CaOCl_2$	By passing chlorine gas over dry slaked lime $Ca(OH)_2 + Cl_2$ ↓ $CaOCl_2 + H_2O$	(i) For bleaching cotton textile (ii) For disinfecting drinking water (iii) As an oxidising agent in chemical industry (iv) Manufacturing chloroform
Plaster of Paris	Calcium sulphate hemihydrate	$CaSO_4 \cdot H_2O\frac{1}{2}$	By heating gypsum at 373K $CaSO_4.2H_2O$ Gypsum ↓373K $CaSO_4\cdot\frac{1}{2}H_2O + 1\frac{1}{2}H_2O$	(i) For making statues, models, toys, etc (ii) For making fireproof materials (iii) For setting fractured bones