



AMBITION INSTITUTE

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ACID

CHAPTER - 2

ACIDS, BASES & SALTS

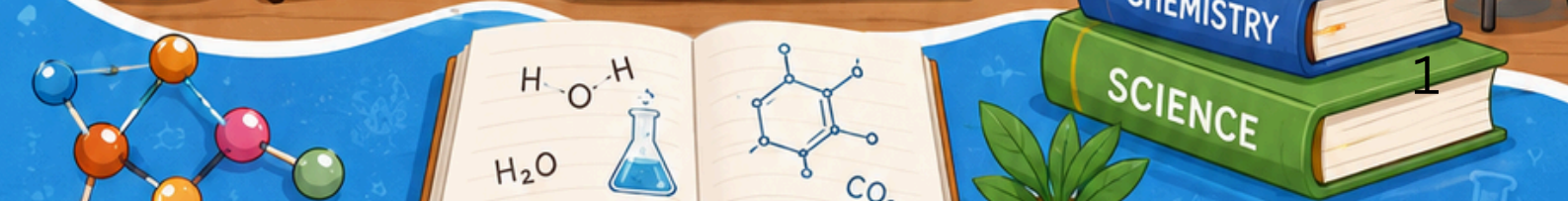
$\text{HCl} \rightarrow \text{Acid}$ ♥
 $\text{NaOH} \rightarrow \text{Base}$ ♥
 $\text{NaCl} \rightarrow \text{Salt}$

BASE

SALT

CLASS
10th

SCIENCE
NOTES



Acids, Bases, and Salts



INDICATORS

Indicators are special substances that help us identify whether a solution is acidic or basic (alkaline) by changing their colour or smell.

Types of Indicators :

Natural Indicators: Obtained from natural sources, mainly plants.

Examples: Litmus paper, Turmeric

Synthetic Indicators: Prepared artificially in laboratories.

Examples: Phenolphthalein, Methyl Orange

Olfactory Indicators: Indicators whose smell changes in acidic or basic solutions.

Examples: Onion, Vanilla, Clove oil

Indicator	In Acid	In Base	Picture Representation
Red Litmus	No change	Turns Blue	
Blue Litmus	Turns Red	No change	
Turmeric	Yellow	Reddish Brown	
Phenolphthalein	Colourless	Pink	
Methyl Orange	Red	Yellow	

Universal Indicator

A **Universal Indicator** is a mixture of several indicators.

- Shows different colours at different pH values.
- Helps determine how strong an acid or base is.
- Indicates the pH of a solution.



Acids, Bases, and Salts



ACIDS

Acids are substances that turn blue litmus red and have a sour taste
(Everyday Examples: Lemon, Orange, Raw Mango, Grapes, Tamarind)

Organic Acids And Mineral Acids _____

Organic Acids (Weak Acids)

Organic acids are naturally found in plants and animals.

Common Organic Acids: Acetic Acid, Citric Acid, Lactic Acid, Tartaric Acid, Oxalic Acid, Formic (Methanoic) Acid

Organic Acid	Found In
 Acetic Acid	Vinegar (Sirka) 
 Citric Acid	Citrus fruits 
 Lactic Acid	Curd and sour milk 
 Tartaric Acid	Tamarind and grapes 
 Oxalic Acid	Tomato 
 Formic (Methanoic) Acid	Ant sting and nettle leaf sting 



Mineral Acids (Strong Acids)

Mineral acids are obtained from minerals of the earth and are generally stronger than organic acids.

Common Mineral Acid: Hydrochloric Acid, Sulphuric Acid, Nitric Acid, Carbonic Acid

Concentrated vs Dilute Acids _____

Concentrated Acid: A concentrated acid contains very little water and a large amount of acid.

Dilute Acid : A dilute acid contains more water and comparatively less acid.

ACIDS

Chemical Properties of Acids

Reaction with Metals

Metal + dilute acid $\rightarrow$ Salt + hydrogen gas

Eg:- $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$

Most of the acids react with metal to form salt and evolve H_2 gas

As we see that acids react with the metal to form poisonous salt therefore we do not keep curd or sour eatables in brass or copper metals

Reaction with Metals Carbonate and Metal Hydrogencarbonate

Metal carbonate/ metal hydrogen carbonate + acid $\rightarrow$ salt + CO_2 + H_2O

Eg: - $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

The CO_2 (Carbon dioxide) gas is formed with Brisk effervescence.

Reaction with Metals Oxides

Metal oxide + acid $\rightarrow$ salt + water

Eg: $\text{CuO} + 2\text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}$

This reaction shows basic nature of metal oxides.

What do all Acids have in common?

All acids have one thing in common: they produce hydrogen ions (H^+) in aqueous solution, and these H^+ ions are responsible for their acidic properties.

BASES

**Bases are substances that Turn red litmus paper blue, Taste bitter
Feel soapy/slippery when touched**

Common Water-Soluble Bases

Sodium Hydroxide

Potassium Hydroxide

Calcium Hydroxide

Magnesium Hydroxide

What Makes All Bases Similar? _____

A base produces hydroxide ions (OH^-) when dissolved in water.
 OH^- ions are responsible for the basic nature of bases.

Strong Bases vs Weak Bases _____

Strong Bases: Strong bases ionize completely in water and produce a large number of OH^- ions.

Examples: Sodium Hydroxide (NaOH), Potassium Hydroxide (KOH)

Weak Bases: Weak bases ionize only partially in water and produce fewer OH^- ions.

Examples: Ammonium Hydroxide (NH_4OH), Calcium Hydroxide [$\text{Ca}(\text{OH})_2$],
Magnesium Hydroxide [$\text{Mg}(\text{OH})_2$]

Properties of Bases _____

Physical Properties

- Bitter in taste
- Soapy or slippery to touch
- Conduct electricity in aqueous solution
- Turn red litmus blue

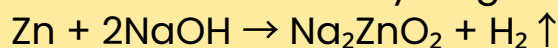


BASES

Chemical Properties of Bases _____

Reaction with Metals

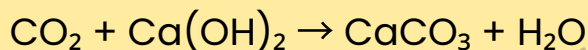
Metal + Base $\rightarrow$ Salt + Hydrogen Gas



Therefore, strong bases should not be stored in certain metal containers.

Reaction with Non-Metal Oxides

Base + Non-metal Oxide $\rightarrow$ Salt + Water

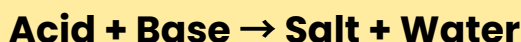


Since bases neutralize non-metal oxides, non-metal oxides are acidic in nature.

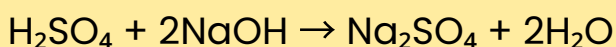
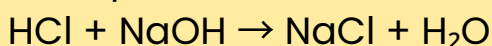
ACID + BASE

Neutralisation Reaction

When an acid reacts with a base, they cancel each other's effect and form salt and water.

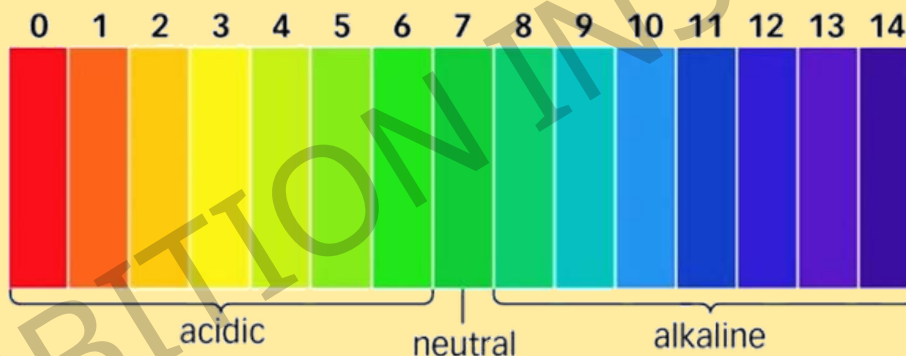


Examples:



pH SCALE

pH (Potential of Hydrogen) is a scale used to measure how acidic or basic a solution is.



Importance of pH in Everyday Life

1. pH and Living Organisms

Plants and animals can survive only within a specific pH range.

Human Body

Normal body fluids work best between:

pH 7.0 – 7.8

Even small changes may affect normal body functions.

2. Acid Rain

Rainwater with pH below 5.6 is called acid rain.

Effects:

- Lowers the pH of rivers and lakes

ACID + BASE

- Harms aquatic organisms
- Damages plants and buildings

3. pH of Soil

Different crops require different soil pH levels.

Why is soil pH tested?

- Helps select suitable crops
- Helps choose proper fertilizers
- Improves crop growth and yield

4. pH in Our Digestive System

Our stomach contains Hydrochloric Acid (HCl) which helps digest food.

Problem

Too much acid causes:

Acidity

Indigestion

Stomach irritation

Solution

Antacids: (mild bases) neutralize excess acid.

Examples: Milk of Magnesia, Sodium Hydrogen Carbonate

5. Tooth Decay and pH

Tooth enamel is mainly made of calcium phosphate.

Danger Zone

When mouth pH falls below 5.5, enamel starts dissolving.

Cause

Bacteria break down food particles and sugars to produce acids.

Prevention

- Brush regularly
- Rinse mouth after meals
- Use basic toothpaste to neutralize acids

6. Self-Defence in Animals

Our stomach contains Hydrochloric Acid (HCl) which helps digest food.

Problem Some insects inject acidic substances when they sting.

Examples

ACID + BASE

Ant sting → Formic (Methanoic) Acid

Bee sting → Acidic venom

Relief

Apply a mild base such as baking soda paste to neutralize the acid.

Too much acid causes:

Antacids: (mild bases) neutralize excess acid.

Examples: Milk of Magnesia, Sodium Hydrogen Carbonate

7. pH in Plants

Nettle Plant

Nettle leaves inject methanoic acid, causing burning and irritation.

Natural Remedy

Rubbing the affected area with dock plant leaves can provide relief.

Dilution

Dilution is the process of reducing the concentration of an acid or base by adding water.

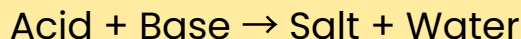
Result

Concentration of ions decreases.

Solution becomes less concentrated.

SALTS

Salts are formed by the neutralisation reaction between an acid and base



Properties of Salts

Mostly solid and crystalline.

Usually soluble in water.

Conduct electricity in solution.

Made up of ions:

Cation (+) → Positive ion

Anion (-) → Negative ion

Family of Salts

Salts having the same positive ion belong to the same family.

Example: NaCl , Na_2SO_4 → Sodium salt family (Na^+)

Common Salt (NaCl)

Sources

- Sea water
- Rock salt deposits

Uses

Used as a raw material for making:

Sodium hydroxide (NaOH)

Baking soda (NaHCO_3)

Washing soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)

Bleaching powder (CaOCl_2)

Bleaching Powder

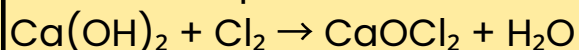
Formula

Calcium Oxychloride (CaOCl_2)

Preparation

Bleaching powder is prepared by passing chlorine gas over dry slaked lime.

Chemical Equation



Uses

- Bleaching cotton and linen fabrics
- Disinfecting drinking water

SALTS

- Used as an oxidising agent in industries
- Manufacture of chloroform

Baking Soda _____

Formula

Sodium Hydrogen Carbonate (NaHCO_3)

Preparation

Prepared from brine solution using ammonia and carbon dioxide.

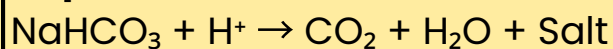
Properties

Mild basic salt

White crystalline powder

Releases carbon dioxide when heated or treated with acid

Important Reaction



Uses:

Baking Powder

Baking powder contains:

- Baking soda (NaHCO_3)
- Tartaric acid

During baking, CO_2 gas is produced which makes cakes and bread soft and fluffy.

Antacids

Used to neutralise excess stomach acid.

Fire Extinguishers

Used in soda-acid fire extinguishers because it releases CO_2 .

Washing Soda _____

Formula

$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (Sodium Carbonate Decahydrate)

Preparation

Prepared by recrystallising sodium carbonate with water.

Chemical Equation: $\text{Na}_2\text{CO}_3 + 10\text{H}_2\text{O} \rightarrow \text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

SALTS

Uses

- Softening hard water
- Washing clothes
- Paper, paint and textile industries
- Manufacturing compounds like borax

Water of Crystallisation

The $10\text{H}_2\text{O}$ in washing soda represents the fixed number of water molecules attached to each formula unit of the salt.

These water molecules are called Water of Crystallisation.

Examples

Copper Sulphate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)

Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)

Washing Soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)

Plaster of Paris (POP)

Formula

$\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (Calcium Sulphate Hemihydrate)

Preparation

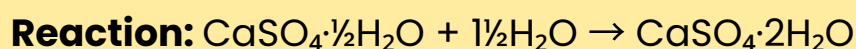
POP is obtained by heating gypsum.

$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ (Gypsum)

Chemical Equation



Setting of POP: When water is added to POP, it changes back into gypsum and becomes hard.



Uses

- Supporting fractured bones (Plaster casts)
- Making toys and models
- Decorative materials
- Making smooth walls and surfaces