# Acids and its Classification

## Introduction to Acids

Acids are substances that have a sour taste.

The word "acid" is derived from the Latin word "acidus," meaning sour.

**Examples of naturally occurring acids:**

- Lemon juice contains citric acid.
- Vinegar contains acetic acid.
- Curd and milk contain lactic acid.
- Amla contains ascorbic acid.
- Spinach contains oxalic acid.

## Historical Background

### i. Discovery of Acidic Nature of Lemon Juice (17th Century):

Scientists discovered the acidic properties of lemon juice, leading to the identification of citric acid and acetic acid.

### ii. Lavoisier's Study of Acids (18th Century):

Antoine Lavoisier studied substances with sour tastes and classified them as acids.

His work contributed to understanding acid-base chemistry.

## Classification of Acids

### i. Based on Origin

**Organic Acids:** Derived from natural sources, e.g., formic acid, citric acid, acetic acid.

**Mineral Acids:** Synthetic and industrially produced, e.g., hydrochloric acid (HCl), sulfuric acid ($H_2SO_4$), nitric acid ($HNO_3$).

### ii. Based on Strength

**Strong Acids**: Completely ionize in water (HCl, $H_2SO_4$, $HNO_3$).

**Weak Acids:** Partially ionize in water (acetic acid, citric acid, formic acid).

### iii. Based on Concentration

**Concentrated Acid:** High amount of acid in a small amount of water.

**Dilute Acid:** Low amount of acid mixed with a large amount of water.

## Physical Properties of Acids

- Acids taste sour.
- They turn blue litmus paper red.
- Acids are corrosive.
- Acidic solutions conduct electricity.
- Acids dissolve in water, producing heat.

## Bases and Their Properties

Substances that taste bitter and feel soapy are called bases.

**Examples:** Soap, baking soda (sodium bicarbonate), lime water (calcium hydroxide).

## Properties of Bases:

- Bases turn red litmus paper blue.
- They have a slippery texture.
- They conduct electricity in solution.

## Indicators: Identifying Acids and Bases

## Natural Indicators

### i. Litmus:

Extracted from lichens.

**Acidic solution:** Litmus turns red.

**Basic solution:** Litmus turns blue.

### ii. Turmeric:

Acidic or neutral solution: Yellow.

Basic solution: Turns red.

### iii. China Rose (Gudhal):

**Neutral solution:** Light pink.

**Acidic solution:** Deep pink.

**Basic solution:** Green.

### Synthetic Indicators

#### i. Methyl Orange:

**Acidic medium:** Red.

**Basic medium:** Yellow.

**Neutral medium:** Orange.

#### ii. Phenolphthalein:

**Acidic medium:** Colorless.

**Basic medium:** Pink.

**Neutral medium:** Colorless.

### Uses of Important Acids

### Hydrochloric Acid (HCl)

Used in laboratories and industrial processes.

Helps in food preparation and preservation.

Used to manufacture PVC, fertilizers, and dyes.

Cleans metals and removes rust (descaling).

### Sulfuric Acid ($H_2SO_4$)

Used in storage batteries.

Essential in petroleum refining.

Produces fertilizers like ammonium sulfate.

Important in detergent and textile industries.

### Conclusion

Acids and bases play essential roles in chemistry and daily life.

They can be identified using indicators like litmus, turmeric, and synthetic indicators.

Understanding their properties helps in safe handling and industrial applications.