# Chapter 5

# Acids, Bases, and Salts

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## Acids and Bases

♦ Acid:

An acid is a chemical substance that has a sour taste. Acids are corrosive in nature and harmful to the skin. Some common acids are given below:

| Name of the acid | Found in |
|---|---|
| Lactic acid | Curd |
| Formic acid | Ant sting |
| Citric acid | Citrus fruits (Orange, lemon etc.) |
| Tartaric acid | Tamarind, tomato, grapes, unripe mangoes etc. |
| Ascorbic acid | Amla, Citrus fruits |
| Acetic acid | Vinegar |
| Oxalic acid | Spinach |

♦ Base:

A base is a chemical substance that has a bitter taste and a soapy touch. They are corrosive and good conductors of electricity as they allow the passage of electrons through them.

| Name of the base | Found in |
|---|---|
| Sodium hydroxide or Potassium hydroxide | Soap |
| Calcium hydroxide | Lime water |
| Ammonium hydroxide | Window cleaner |
| Magnesium hydroxide | Anta acid (milk of magnesia) |

# Indicators

These are special kind of substances that help us to find whether a substance is an acid or a base are called indicators and changes their color to indicate the presence of a chemical substance.

There are two types of indicators:

♦ Natural Indicators:

Indicators that are found in nature are called natural indicators. Examples of Natural Indicators:

(a) Litmus:

The litmus is a natural indicator that is extracted from lichens. The lichens are organism that arises from cyanobacteria or algae. It is purple-colored which is mixed with water to form an indicator solution.

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It is also available in the form of strips, known as litmus paper. The basic solution converts red litmus blue while the acidic solution converts blue litmus red.

| | Red Litmus | Blue Litmus |
|---|---|---|
| **Acidic solution** | No change | Red |
| **Basic solution** | Blue | No change |
| **Neutral solution** | No change | No change |

(b) China Rose (Red hibiscus):

China rose is a natural indicator that is extracted from the petals of China rose or 'Gudhal'.

CHINA ROSE

It is prepared by soaking the petals of China rose in warm water until the water becomes colored. This colored solution is used as an indicator. This solution turns acidic solution to dark pink or magenta while the basic solution to green.

(c) Turmeric:

Turmeric is the type of natural indicator which is used to check the acidity or basicity of any substance.

Turmeric

It is yellow in an acidic and neutral medium while it changes its color to red in a basic medium.

♦ Synthetic Indicators:

Indicators that are found from chemical substances are called synthetic indicators. Examples of Synthetic Indicators:

Phenolphthalein: Phenolphthalein is a commonly used indicator that is a colorless solution. The colorless solution changes to pink in the basic medium. When phenolphthalein is added to an acidic or neutral solution, it remains colorless.

**Question**: An unknown solution is treated with phenolphthalein. The color changes to pink. What will be the color of the solution when it is treated with turmeric solution?

**Answer:** The unknown solution convert to pink color when phenolphthalein is added to it. It means that the solution is a base. The turmeric solution changes to red in basic medium. This means that the unknown solution changes its color to red when turmeric solution is added to it because it is a base.

Therefore, the correct answer is red.

## Neutralisation

It is the reaction in which an acid reacts with a base to form a new substance and water along with the evolution of heat. Thus, a new substance is formed called salt.

For example, When hydrochloric acid reacts with sodium hydroxide to form sodium chloride and water. The sodium chloride form is salt. The chemical reaction is shown below:

$$\text{Hydrochloric acid}(HCl) + \text{Sodium hydroxide}(NaOH) \rightarrow \text{Sodium chloride}(NaCl) + \text{Water}(H_2O)$$

*Salt:*

- It is formed by neutralization process.
- Salt can be acidic, basic, or neutral depending on its reactants.
- Salt exists in different colors which may range from colorless to almost all different colors.
- They always exist in solids with high melting points.
- They conduct electricity when dissolved in water or in a molten state.
- For example sodium chloride, magnesium chloride, etc.

## Neutralisation in Everyday Life

(a) Indigestion:

Too much acid in the stomach causes indigestion. It is neutralized by taking antacid-like milk of magnesia.

(b) Ant sting:

When an ant bites, it injects formic acid into the skin. The effect is neutralized by rubbing moist baking soda (sodium hydrogen carbonate) or calamine (containing zinc carbonate).

(c) Soil treatment:

When the soil is too acidic, it is neutralized by treating with quicklime (calcium oxide) or slaked lime (calcium hydroxide).

→ To neutralise the acidity of the soil, we use bases such as quick lime (CaO) i.e. Calcium Oxide or slaked lime; $Ca(OH)_2$.

→ To neutralise the basicity of soil we use organic wastes, earthworms, and other forms of living or dead organisms.

(d) Factory wastes:

Wastes containing acids from the factory flow into water bodies which can harm and kill aquatic life therefore, these acidic wastes are neutralised by adding basic substances.