

Ch-5- Acids, Bases and Salts

Acids

Bases

Indicators

Neutralization

Neutralization in Everyday Life

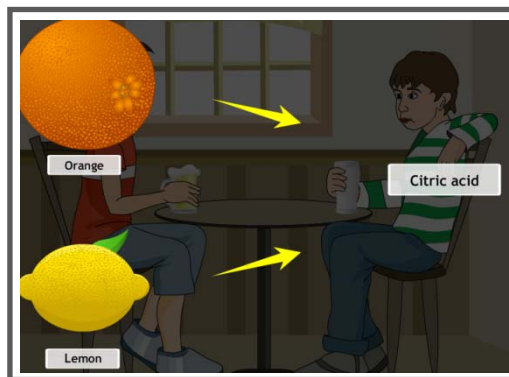
Acids

Acids

The word acid came from the word 'acere' which means sour. Substances like vinegar, citric acid and curd are sour in taste and hence acidic in nature. Such substances are called acids. Lime juice and curd are examples of natural acids.

Properties of acids:

- Are generally sour in taste. (For example, the sour taste of lemon juice is due to citric acid)
- Strong or concentrated acids or their fumes often produce a stinging feeling on mucous membranes.
- Blue litmus paper turns red.
- Conduct electricity, depending on the degree of dissociation in aqueous solution



Bases

Substances like baking soda and lime water which are bitter in taste and feel soapy on touching are basic in nature or called as bases.

Properties of Base:

- Slimy or soapy feel on fingers, due to saponification of the lipids in human skin.
- Concentrated or strong bases are caustic (corrosive) on organic matter and react violently with acidic substances.
- Aqueous solutions or molten bases dissociate in ions and conduct electricity.
- Red litmus paper turns blue.

Indicators

Special types of substances which are used to test whether a substance is acidic or basic are known as indicators. These indicators change their colour on addition of an acid or base. China rose, phenolphthalein, methyl orange are examples of indicators.

Natural Indicators

Litmus: A natural dye

Litmus is extracted from lichens and has a mauve (purple) colour in distilled water. It gives red colour with acids and blue colour with bases. Litmus may be in solution form or in the form of strips.

Activity

Take two test tubes and add citric acid in one and soap solution in another. Now dip a strip of blue litmus paper in citric acid and observe the colour change. Now do the same with red litmus paper. Do vice-versa for soap solution and observe the difference.

Acidic solutions (citric acid) turn blue litmus red and basic solution (soap solution) turn red litmus to blue.

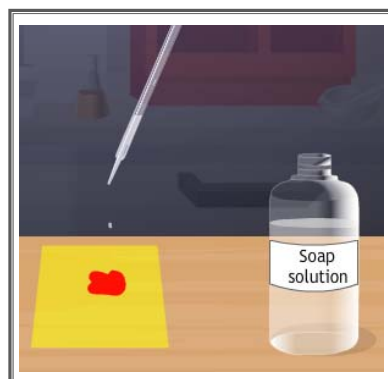
The solutions which do not change the colour of either red or blue litmus are known as neutral solutions. These substances are neither acidic nor basic.

Turmeric

Turmeric can also be used as a natural indicator. Turmeric paste (in water) gives red colour with basic solution and remains yellow when acidic solutions are added.

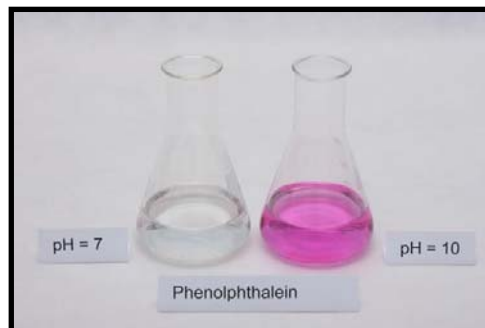
China Rose as Indicator

China rose indicator turns acidic solutions to dark pink (magenta) and basic solutions to green.



Synthetic Indicator

Synthetic indicators or laboratory indicators are chemicals that are used to check the presence of acid or base. Some synthetic indicators are phenolphthalein and methyl orange.



Activity

Take small amount of hydrochloric acid in a test tube and sodium hydroxide in another. Add drop by drop phenolphthalein solution in both the test tubes one by one. You will observe that sodium hydroxide solution turns pink while hydrochloric acid does not change in colour. Hence, we conclude that phenolphthalein gives pink colour in basic medium.

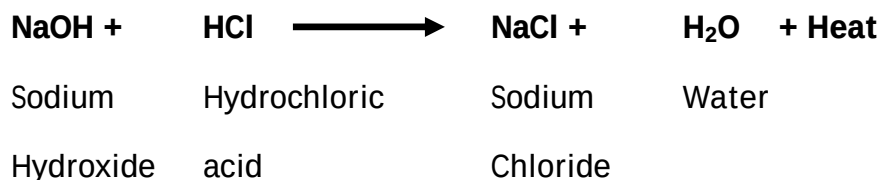
Neutralization

The reaction between an acid and a base is known as neutralization. Salt and water are produced in this process with the evolution of heat.

Acid + Base → Salt + Water

Let us learn neutralization reaction with help of experiment.

Take a conical flask filled with 20 milliliter sodium hydroxide in it. Now add two or three drop phenolphthalein solution in it. What do you observed? You find the sodium solution turns pink. What is concluded from this? This mean sodium hydroxide is basic in nature. Now take dilute hydrochloric acid in a burette. Now add this acid drop by drop into conical flask with constant shaking. Stop adding hydrochloride acid when pink colour solution completely disappears. We conclude that, when the solution turns colourless, sodium hydroxide is completely neutralized by hydrochloric acid.



Neutralization in Everyday Life

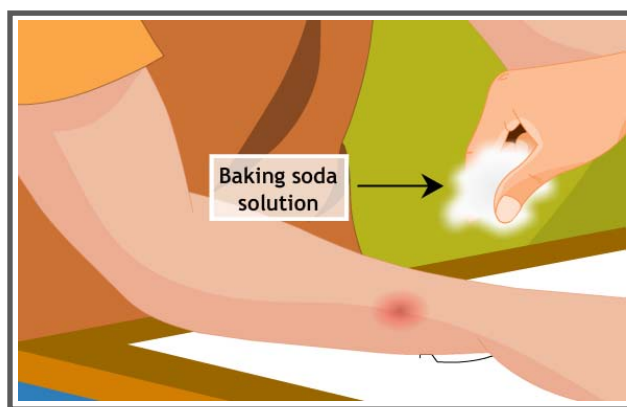
Neutralization reaction is also useful in our day to day life.

Indigestion

Hydrochloric acid present in stomach is essential for the digestion of food. Sometimes, our stomach produces excess acid, which causes pain and irritation. This condition is known as acidity or indigestion. To get relief from this condition, milk of magnesia is used as an antacid. Milk of magnesia contains magnesium hydroxide, which is a mild base. It reacts with excess acid present in the stomach, and neutralizes it.

Ant bite

When an ant bites, it injects formic acid into the skin, which causes pain and irritation. To neutralize the effect of formic acid, baking soda (sodium hydrogen carbonate) or zinc carbonate can be applied on the skin for relief.



Soil treatment

Soil becomes acidic or basic when an excess of chemical fertilizers are used. Plants are unable to grow well in acidic or basic soil. Hence, to neutralize the acidity of soil, quick lime (calcium oxide) or slaked lime (calcium hydroxide) is added to soil. To neutralize excess basicity, soils are treated with organic matter, containing organic acids.

Factory wastes

The wastes of many factories contain acids. If they are allowed to flow into the water bodies, the acids will destroy the aquatic habitat. The factory wastes are, therefore, neutralised by adding basic substances.

Tooth enamel, which is made of calcium phosphate, is the hardest substance in the human body. It does not dissolve in water. However, it breaks down, or disintegrates, or decays on reacting with acids. These acids are produced in the mouth due to degradation of sugar and food particles by certain bacteria.

Toothpaste, which we use daily for cleaning our teeth, is generally basic. Hence, it can neutralize excess acid present in the mouth and prevent tooth decay. The wastes of many industries contain acids. This waste, when thrown directly into the water bodies, harms the aquatic life. Hence, this waste is first treated with basic chemicals to neutralize the effect of acids present in it.

