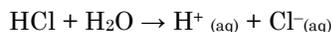


ACIDS

The word "acid" comes from the Latin word "acidus" which means sour.

According to Arrhenius theory an acid is a substance which ionizes and gives hydrogen ions when dissolved in water

Example: Hydrochloric acid in water releases H⁺ ions.



A hydrogen ion cannot exist on its own, so it combines with a water molecule to form a hydronium ion.

Example: Hydrochloric acid when dissolved in water liberates a hydrogen ion and a chloride ion. The hydrogen ion combines with water to form a hydronium ion.



Classification of acids:

Classification of acids based on source:

Based on the source the acids were classified into two types. They are organic acids and in-organic acids.

Organic acids:

Acids obtained from food like curd, lemons, grapes, raw mango, citrus fruits and gooseberry are called organic acids.

In-organic acids:

Acids which are synthesised in the laboratory are called as in-organic acids or mineral acids

Following table is the list of some acids which are used in the laboratory.

Name of the acid	Chemical formula
Sulphuric acid	H ₂ SO ₄
Nitric acid	HNO ₃
Hydrochloric acid	HCl
Acetic acid	CH ₃ COOH

Classification of acids based on concentration:

The word concentration indicates the quantity of acid in relative to the quantity of water in the aqueous solution of that acid.

Highly concentrated acid contains high percentage of acid in comparison with water in that solution.

Low concentrated acid contains low percentage of acid in comparison with water in that solution.

Dilution of acid:

Mixing an acid with water reduces the concentration of hydronium ions of the acid per unit volume. This is called dilution of acid. The action of acids with water is exothermic as heat is generated on dilution.

Classification of acids based on strength:

Based on ionisation, the acids were classified into strong acids and weak acids.

Strong acids: Acids which ionise completely into its ions are called strong acids.

Example: HCl, H₂SO₄, HNO₃...etc

Weak acids: Acids which ionise partially into its ions are called weak acids.

Example: CH₃COOH, H₂CO₃...etc

Classification of acids based on basicity of acids:

Based on basicity acids were classified into different types. They are

Mono-basic acids

Di-basic acids

Tri-basic acids

Mono-basic acids:

Acids which on ionisation produces one hydronium ion in water are termed as mono-basic acids.

Example: HCl

Di-basic acids:

Acids which on ionisation produces two hydronium ions are called as di-basic acids.

Example: H₂SO₄, H₂CO₃ .etc

Tri-basic acids:

Acids which on ionisation produces three hydronium ions are called as tri-basic acids.

Example: H₃PO₄, H₃PO₃..etc

Properties of acids:

Acids have corrosive action on skin.

Acids are good conductors of electricity.

Acids neutralizes bases to form salt and water.

Chemical properties of acids:

Reaction of acids with active metals:

Acids reacts with metals to form metal salts. In this reaction, hydrogen gas is liberated.

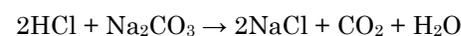
Example: In the reaction of hydrochloric acid reacts with zinc produces hydrogen gas and zinc chloride.



Reaction of acids with metal carbonates:

Acids reacts with metal carbonates to form corresponding salts, carbon dioxide and water.

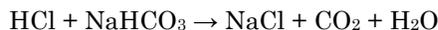
Example: Hydrochloric acid on reaction with sodium carbonate forms sodium chloride, carbon dioxide and water.



Reaction of acids with metal hydrogen carbonates:

Acids reacts with metal hydrogen carbonates and form corresponding salts, carbon dioxide and water.

Example: Hydrochloric acid on reaction with sodium bicarbonate forms sodium chloride, carbon dioxide and water.

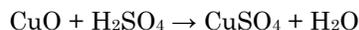


Reaction of acids with metal oxides:

Acids reacts with metal oxide to form salt and water.

Example:

Sulphuric acid on reaction with cupric oxide forms copper sulphate and water.



Indicators:

An acid base indicator is a substance which exhibits different colour in acids and bases.

Red cabbage is a visual indicator used to detect acids.

Onions are called olfactory indicators. They change their odour with change in the nature of solution.

Litmus is a natural indicator and is extracted from lichens.

Apart from natural indicators there are a few synthetic indicators, such as methyl orange and phenolphthalein.

Following table gives colours of the indicators in presence of acids and bases

Indicator	Acid	Base
Methyl orange	Red	Yellow
Phenolphthalein	Colourless	Pink
Blue litmus paper	Red colour	No Change
Red litmus paper	No change	Blue colour

Universal indicator is a mixture of different number of indicators which shows different colours in different solutions.

Uses of acids:

- Sulphuric acid is used in the manufacture of fertilisers, paints, dyes, chemicals , plastics and synthetic fibres.
- Sulphuric acid is also used in car batteries.
- Nitric acid is used in the manufacture of fertilizers, explosives like TNT, dyes and drugs.
- Hydrochloric acid is used before galvanizing, to remove oxide film from steel and also as a descaling agent for boilers. It is also used in the textile, leather and food industry.
- Hydrochloric acid used in the manufacture of glucose from corn starch.
- Ethanoic acid (CH_3COOH) is used for coagulating latex to prepare rubber from it. It is also used in the preparation of perfumes.
- Boric acid (H_3BO_3) is useful as an antiseptic and insecticide.
- Boric acid is useful as a flame retardent.
- Carbonic acid (H_2CO_3) is useful in the form of carbonated drinks