

Acids, Bases & Salts

Salts & its Types

❖ Salts

A salt is a compound formed by the reaction of an acid with a base in which the hydrogen of the acid is replaced by the metal.

In polybasic acids, more than one hydrogen atoms are present in a molecule. The hydrogen atoms can be replaced partially or completely. So, two kinds of salts are possible.

Here, partial replacement of hydrogen atoms from H_2SO_4 has resulted in the formation of sodium hydrogen sulphate.

Here, complete replacement of hydrogen atoms from H_2SO_4 has resulted in the formation of sodium sulphate. NaHSO_4 and Na_2SO_4 represent two kinds of salts.

Types of Salts:

The different types of salts are: normal salt, acid salt, basic salt and double salt.

1. Normal salt: A salt that does not contain any replaceable hydrogen atoms or hydroxyl groups is called a normal salt.

Examples:

Na_2SO_4 obtained in the reaction between H_2SO_4 and NaOH is a normal salt because it is formed by the complete replacement of both the H atoms of H_2SO_4 .

Similarly, calcium sulphate (CaSO_4), sodium phosphate (Na_3PO_4) and potassium phosphate (K_3PO_4) are also normal salts.

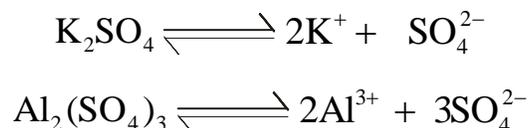
2. Acid salt: When a polybasic acid is not completely neutralized by a base, the salt produced will contain replaceable hydrogen atoms. Hence, it may further take part in the reaction with the base as an acid. Such a salt is called an **acid salt**.

For example, the salt NaHSO_4 produced in the reaction between NaOH and H_2SO_4 is an acid salt because it is capable of further reaction with the base NaOH to produce the normal salt Na_2SO_4 .

Thus, "A salt that contains replaceable hydrogen atoms is called an acid salt".

4.Double salt: In a double salt, there are two different negative ions and / or positive ions. For example, the mineral dolomite, $\text{CaCO}_3 \cdot \text{MgCO}_3$, contain both Ca^{2+} and Mg^{2+} ions. Hence, it is a double salt. Potash alum, $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$, also is a double salt.

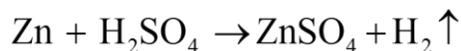
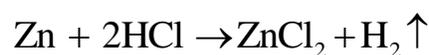
Double salts exist only in the solid state. When dissolved in water, they break up into a mixture of two separate salts. For example, when potash alum is dissolved in water, it breaks up as follows.



Preparation of Salts:

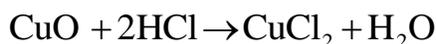
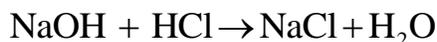
1.By the reaction between metal and acid:

Certain metals (for example, Zn and Mg) react with HCl or H_2SO_4 to form salt and water.



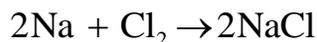
2.By the reaction between an acid and a base:

All acid-base reactions (neutralization reactions) produce salts.



3.By direct union of a metal and a nonmetal:

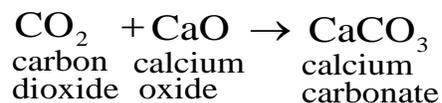
Sodium and chlorine combine directly to form sodium chloride.



Similarly, when sulphur is heated with iron filings, ferrous sulphide (FeS) is formed.



4.By the union between an acidic oxide and a basic oxide:



Thus, a more reactive metal can displace a less reactive metal from a solution of its salt.

Uses of Salts:

The following table gives uses of some salts.

Salts	Uses
Sodium chloride	<ol style="list-style-type: none">1. An essential requirement of our food2. In the preservation of food3. In curing fish and meat4. In making a freezing mixture which is used by icecream vendors5. In the manufacture of soaps
Sodium carbonate	<ol style="list-style-type: none">1. As washing soda for cleaning clothes2. Used in the manufacture of glass, paper, textiles, caustic soda, etc.3. In the refining of petroleum4. In fire extinguishers
Sodium bicarbonate	<ol style="list-style-type: none">1. Used as baking soda2. In fire extinguishers3. As an antacid in medicine
Potassium nitrate	<ol style="list-style-type: none">1. To make gunpowder, fireworks and glass2. As a fertilizer in agriculture
Copper sulphate	<ol style="list-style-type: none">1. Commonly called 'blue vitriol', used as a fungicide to kill certain germs2. In electroplating3. In dying
Potash alum	<ol style="list-style-type: none">1. Used to purify water; makes suspended particles in water settle down2. As an antiseptic3. In dying