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.

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 .

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 su1phate ($CaSO_4$), 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.

$H_2SO_4 + NaOH \rightarrow NaHSO_4 + H_2O$

$NaHSO_4 + NaOH \rightarrow Na_2SO_4 + H_2O$

Thus, an acid salt may be defined as follows.

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

EXAMPLES :

$NaHSO_4$, NaH_2PO_4 and Na_2HPO_4 are examples of acid salts.

3. Basic salt : When a polyacidic base reacts with lesser amount of acid than is necessary for complete neutralization, the salt produced contain hydroxyl group(s) (OH) also. Such a salt is called a basic salt.

EXAMPLES :

1 mole of $Pb(OH)_2$ requires 2 moles of HCl for complete neutralization. But when 1 mole of $Pb(OH)_2$ is made to react with 1 mole of HCl, some $Pb(OH)_2$ is left unreacted. The salt produced is not $PbCl_2$, but Pb(OH)Cl.

$$Pb(OH)_2 + HCl \longrightarrow \underset{\text{lead oxychloride}}{Pb(OH)Cl} + H_2O$$

4. Double salt : In a double salt, there are two different negative ions and/or positive ions. For example, the mineral dolomite, $CaCO_3 \cdot MgCO_3$, contains both Ca^{2+} and Mg^{2+} ions. Hence, it is a double salt. Potash alum, $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$, 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.

$$K_2SO_4 \rightleftharpoons 2K^+ + SO_4^{2-}$$

$$Al_2(SO_4)_3 \rightleftharpoons 2Al^{3+} + 3SO_4^{2-}$$

Uses of Salts :

The following table lists uses of some salts.

Salts	**Uses**
Sodium chloride	1. An essential requirement of our food 2. In the preservation of food 3. In curing fish and meat 4. In making a freezing mixture which is used by icecream vendors 5. In the manufacture of soaps
Sodium carbonate	1. As washing soda for cleaning clothes 2. Used in the manufacture of glass, paper, textiles, caustic soda, etc. 3. In the refining of petroleum 4. In fire extinguishers
Sodium bicarbonate	1. Used as baking soda 2. In fire extinguishers 3. As an antacid in medicine

Potassium nitrate	1. To make gunpowder, fireworks and glass 2. As a fertilizer in agriculture
Copper sulphate	1. Commonly called 'blue vitriol', used as a fungicide to kill certain germs 2. In electroplating 3. In dyeing
Potash alum	1. Used to purify water; makes suspended particles in water settle down 2. As an antiseptic 3. In dyeing