

CHEMISTRY SS1

THIRD TERM

TOPIC: SALTS

What is a Salt?

A Salt is the compound that is formed when all or part of the ionizable hydrogen of an acid is replaced by metallic or ammonium ions.

TYPES OF SALTS

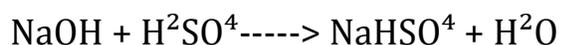
1) Normal salts: These are formed when all the replaceable hydrogen ions in the acid have been completely replaced by metallic ions or basic radicals. eg



Examples of normal salts are: sodium chloride, magnesium tetraoxosulphate vi, silver trioxonitrate v.

Normal salts are neutral to litmus.

2) Acidic Salts: These are formed when the replaceable hydrogen ions of an acid are only partially replaced by a metal or metallic group. Acid salts result when there is an insufficient supply of metallic ions to replace all the replaceable hydrogen ions in the acid. eg $\text{H}_2\text{SO}_4 + \text{KOH} \rightarrow \text{KHSO}_4 + \text{H}_2\text{O}$



Examples of Acidic Salts are; potassium hydrogen tetraoxosulphate iv (KHSO_4), sodium hydrogen trioxocarbonate iv (NaHCO_3)

3) Basic Salts; These are formed when there is an insufficient supply of acids which is needed for the complete neutralization of the base. Basic Salts contains the hydroxide ion, (OH^-). Basic Salts have the properties of base, hence turns red litmus blue. eg $\text{Ca}(\text{OH})_2 + \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$

Examples of basic Salts are; Zinc chloride hydroxide, $Zn(OH)Cl$, Calcium chloride hydroxide, $\{Ca(OH)Cl\}$

4) Double Salts: This is a salt formed by combination of two simple Salts in stoichiometric ratio on crystallizing together. Examples of double salts are: potash alum, $KAl(SO_4)_2 \cdot 12H_2O$

5) Complex Salts: These contain complex ions, ie ions consisting of a charged group of atoms. Examples are: sodium tetrahydrozincate ii $\{Na_2Zn(OH)_4\}$, potassium hexacyanoferrate ii, $\{K_4Fe(CN)_6\}$. Complex Salts are formed by mixing two simple Salts together.

USES OF SALTS:

For the manufacture of many industrial, agricultural and consumer substances like chlorine gas, fertilizers and laxatives. They are also used as food preservatives, drying agents, antifreeze as well as to add taste to our food.

Preparation of Salts:

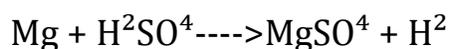
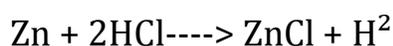
The two methods choose for preparing a particular salt depends largely on its solubility in water and the stability to heat.

PREPARATION OF SOLUBLE SALTS

Soluble salts can be prepared by the following reactions:

i) REACTION OF DILUTE ACID AND METAL

A salt may be prepared by the direct displacement of the hydrogen ions in an acid by a metal more reactive than hydrogen, eg calcium, magnesium, zinc, and iron.

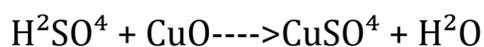


ii) REACTION OF ALKALI AND ACID

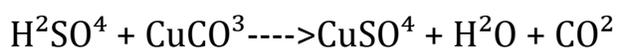
A salt may be prepared by titrating an alkali against an appropriate acid. $\text{KOH} + \text{HNO}_3 \rightarrow \text{KNO}_3 + \text{H}_2\text{O}$

iii) REACTION OF ACID AND INSOLUBLE BASE

The acid is heated and the base is added a little at a time until no more base can dissolve. The excess base is then filtered off, leaving the salt formed in the solution.



iv) REACTION OF ACID AND TRIOXOCARBONATE iv.



PROPERTIES OF SALTS

i) All Salts of sodium, potassium and ammonium are soluble

ii) All trioxonitrate v Salts are soluble

iii) All common chlorides are soluble except that of silver and lead, however, lead ii chloride is soluble in water on warming.

iv) All common tetraoxosulphate iv Salts are soluble except those of calcium and barium.

v) All trioxocarbonate iv Salts are insoluble except sodium, potassium and ammonium trioxocarbonate iv

REACTION OF HEAT

i) All trioxocarbonate iv Salts are decomposed by heat except those of sodium and potassium

ii) All trioxonitrate iv Salts are decomposed by heat

iii) chlorides are stable to heat except ammonium chloride which sublimed on heating

iv) All tetraoxosulphate vi Salts are stable to heat but when strongly heated, iron ii and iii tetraoxosulphate vi are decomposed

REACTION WITH WATER

Normal Salts do not react water except few salts such as sodium trioxocarbonate iv, aluminum chloride and sodium sulphide which undergo hydrolysis in water