

TOPIC: ACID, BASES AND SALTS

Date

7/5/16

No.

1.1 Definitions

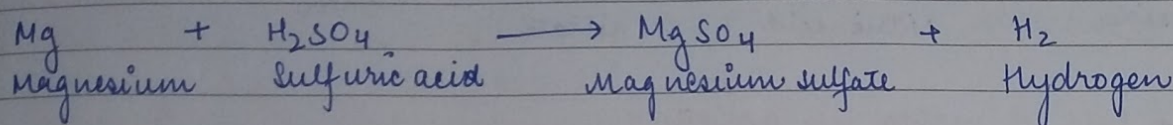
produces

- 1) An **acid** is a substance that produces hydrogen ions, H^+ ions when dissolved in water.
- 2) The **strength** of an acid refers to the extent to which the acid molecule dissociates (i.e. splits into ions) when dissolved in water.
- 3) **Base** is a substance that reacts with an acid to form salt and water only.
- 4) **Neutralisation reaction**: Reaction between an acid and base to form a salt and water only.
- 5) **concentration**: Tells how much a substance is dissolved in $1dm^3$ of the solution.
- 6) **strength**: Refers to how easily an acid / alkali dissociates (ionises) in water when dissolved in water.
- 7) **Alkali**: Base which is soluble in water.
- 8) **pH Scale**: Set of numbers used to show whether a solution is acidic, neutral or alkaline.

Learning outcomes:

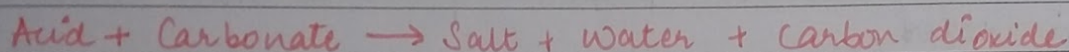
- 1) Define an acid in terms of ions produced in aqueous solution and effect on Universal indicator.
- 2) Describe the characteristic properties of acid in reactions with metal.

Example:

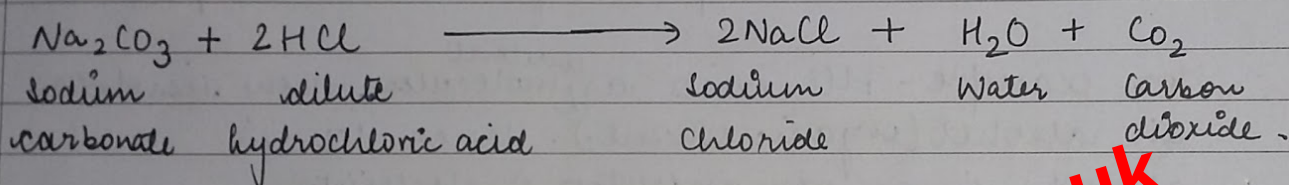


→ MgSO_4 is a salt. Salts of H_2SO_4 are called sulfates, those of nitric acid are called nitrates and those of HCl are chlorides.

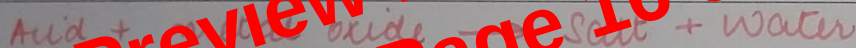
- Acids react with carbonates to form salt, water and carbon dioxide. The general equation is:



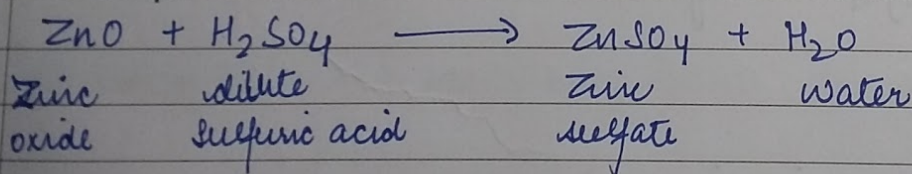
Example:



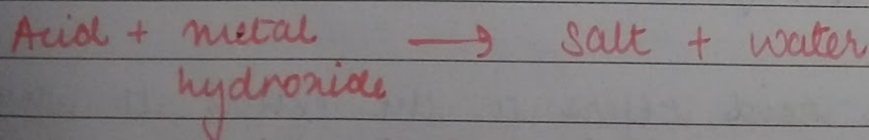
- Acids react with metal oxides and hydroxides to form salt and water only. This reaction is called neutralisation reaction.
General equation:



Example:



- General equation for reaction of an acid with metal hydroxide:



Example:

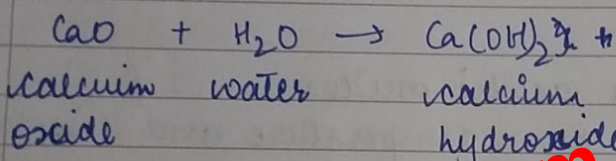
* acidic oxides do not react with acids.

5) Basic oxides:

- Oxides of metals are called basic oxides.
- Most basic oxides are insoluble in water.
- Few oxides, such as sodium oxide, Na_2O , potassium oxide, K_2O and calcium oxide CaO dissolve in water to form alkaline solutions (alkalis).

Example:

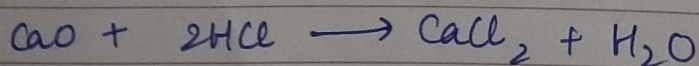
- When calcium oxide is added to water, a vigorous reaction occurs. A white suspension of calcium hydroxide is formed.
- Calcium hydroxide is sparingly soluble in water.



- Calcium oxide, CaO is known as quicklime and aqueous calcium hydroxide is known as (slaked lime).
in water is known as limewater.

- Basic oxides are solid at room temperature.
- React with acids to form salt & water.

Example:



Pro →

separation

Q2 How would you separate the following mixtures?

a) ~~copper oxide is a mixture~~

a) copper oxide from a mixture of copper oxide and zinc oxide?

Ans: • Zinc ^{oxide} is atmospheric oxide and will dissolve in sodium hydroxide solution. Copper oxide is basic oxide and hence won't dissolve in sodium hydroxide solution.

• The following ~~solutions~~ steps were used to separate copper oxide ~~and zinc oxide~~ from a mixture of copper and zinc oxide:

Step 1) Add excess sodium hydroxide solution to a mixture of zinc oxide and copper oxide and stir

Step 2) Filter the ~~solution~~ reaction mixture. Copper ^{oxide} will be the residue.

Step 3) Wash copper oxide with distilled water and dry it using filter paper

b) Carbon monoxide from a mixture of carbon monoxide and carbon dioxide

Ans: ^[Dissolve in sodium hydroxide soln] Carbon monoxide ~~is~~ a neutral oxide whereas carbon dioxide $[CO_2]$ is an acidic oxide and hence its soluble in sodium hydroxide solution.

Step 1: Pass the mixture of gases $[CO \text{ and } CO_2]$ into sodium hydroxide soln. $(NaOH)$

Step 2: Collect carbon monoxide by displacement of water.