

Chemical Properties of Acids and bases

Activity -1:

Aim: To investigate the reaction of acids with metals.

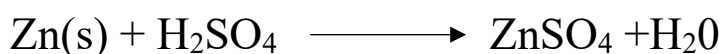
Materials Required: Zn metal, Dil.Sulphuric acid, Soap solution, Candle.

Procedure: Take 5 ml sulphuric acid in a testtube and add Zn metal to it. The evolved gas is passed through soap solution.

Observation: When Zn reacts with Dil.Sulfuric acid Zinc sulphate is formed along with formation of hydrogen gas is observed.

Inference: Acids react with metal to form metal salt and releases Hydrogen Gas.

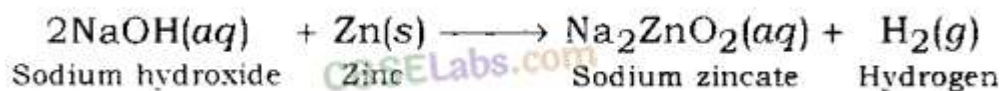
Acid + Metal \rightarrow Salt + Hydrogen Gas



Reaction of Base with Metals: When alkali (base) reacts with metal, it produces salt and hydrogen gas.

Alkali + Metal \rightarrow Salt + Hydrogen

Examples: Sodium hydroxide gives hydrogen gas and sodium zincate when reacts with zinc metal.



Test For Hydrogen Gas: The gas evolved after reaction of acid with metal can be tested by bringing a lighted candle near it. If the gas burns with a pop sound, then it confirms the evolution of hydrogen gas. Burning with pop sound is the characteristic test for hydrogen gas.

Activity- 2

Aim: To experiment the reaction of metal carbonate and metal hydrogen carbonate with metals.

Materials Required: Sodium carbonate, Dil.HCl, Delivery tube, Lime water.

Procedure: To the Dil.HCl is taken in a testtube small amount of sodium carbonate is added.

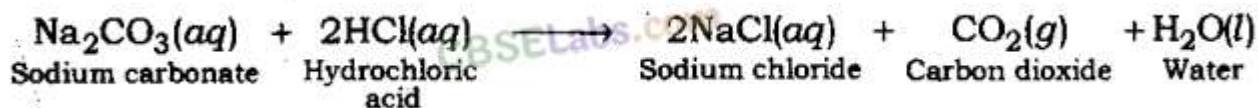
Observation: Brisk effervescence due to the formation of CO₂ gas is observed.

Inference: Acids give carbon dioxide gas and respective salts along with water when they react with metal carbonates. Or metal hydrogen carbonates.

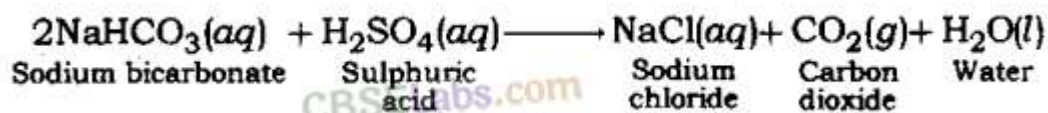
Metal carbonate + Acid → Salt + Carbon dioxide + Water

Examples:

Hydrochloric acid gives carbon dioxide gas, sodium chloride along with water when reacts with sodium carbonate.

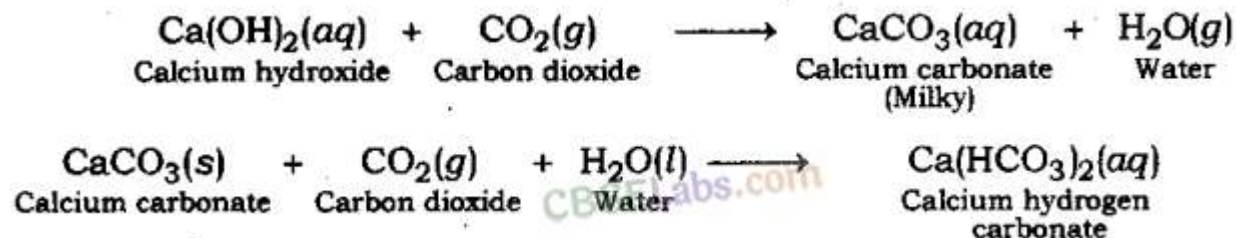


Sulphuric acid gives sodium sulphate, Carbon dioxide gas and water when it reacts with sodium bicarbonate.



Test For Evolution of Carbon Dioxide Gas: Carbon dioxide turns lime water milky when passed through it. This is the characteristic test for carbon dioxide gas.

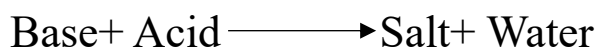
The gas evolved because of reaction of the acid with metal carbonate or metal hydrogen carbonate turns lime water milky. This shows that the gas is carbon dioxide gas. This happens because of the formation of a white precipitate of calcium carbonate.



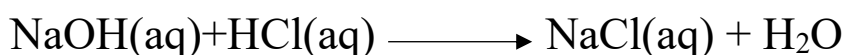
But when excess of carbon dioxide is passed through lime water, it makes milky colour of lime water disappear. This happens because of formation of calcium hydrogen carbonate. As calcium hydrogen carbonate is soluble in water, thus, the milky colour of solution mixture disappears.

3. Neutralisation Reaction:

When an acid reacts with a base, the hydrogen ion of acid combines with the hydroxide ion of base and forms water. As these ions combine together and form water instead of remaining free, thus, both neutralize each other



Example:



4. Reaction of Acid with Metal Oxides: Metal oxides are basic in nature. Thus, when an acid reacts with a metal oxide both neutralize each other. In this reaction, the respective salt and water are formed.

Acid + Metal Oxide \rightarrow Salt + Water

(Metal oxides are basic in nature)

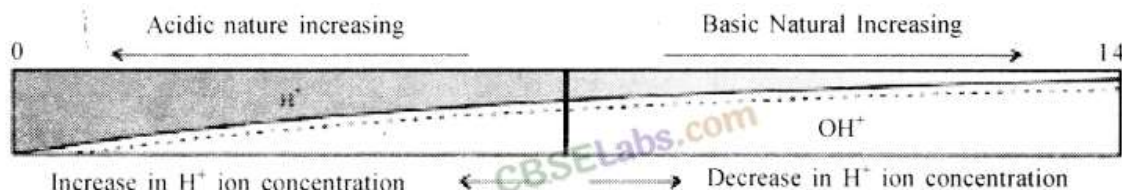
Examples:

Calcium is a metal, thus, calcium oxide is a metallic oxide which is basic in nature. When an acid, such as hydrochloric acid, reacts with calcium oxide, neutralization reaction takes place and calcium chloride, along with water is formed.



Strength of Acid and Base: Acids in which complete dissociation of hydrogen ion takes place are called Strong Acids. Similarly, bases in which complete dissociation of hydroxide ion takes place are called Strong Bases.

In mineral acid, such as hydrochloric acid, sulphuric acid, nitric acid, etc. hydrogen ion dissociates completely and hence, they are considered as strong acids. Since inorganic acids hydrogen ions do not dissociate completely, so they are weak acids.



For water or neutral solutions : pH = 7

For acidic solutions : pH < 7

For basic solution : pH > 7