

# ACIDS, BASES AND SALTS

**1. Acids:** Acids are sour in taste, turn blue litmus red and give  $H_3O^+$  ion (hydronium ions in solution. e.g.  $HCl$ ,  $H_2SO_4$ ,  $HNO_3$  etc

**2. Bases:** Bases are bitter in taste, have soapy touch, turns red litmus blue and give hydroxide ions ( $OH^-$ ) in solution. Example –  $NaOH$ ,  $KOH$  etc

**3. Salts:** - A salt is a compound which is formed by neutralization reaction between an acid and base. For example, sodium chloride is formed by reaction between hydrochloric acid and sodium hydroxide.

$Acid + base \rightarrow Salt + water$



**4. Indicators** - Indicators are substances which indicate the acidic or basic nature of the solution by their colour change. The colour of some acid-base indicators in acidic and basic medium are given below

INDICATORS	COLOUR IN ACIDIC MEDIUM	COLOUR IN BASIC MEDIUM
1. Litmus Solution	Red	Blue
2. Methyl Orange	Pink	Orange
3. Phenolphthalein	Colourless	Pink
4. Methyl Red	Yellow	Red

## 5 Chemical properties of acids

(i) Acids react with active metals to give hydrogen gas.



(ii) Acids react with metal carbonate and metals hydrogen carbonate to give carbon dioxide.



(iii) Acids react with bases to give salt and water. This reaction is called neutralization reaction.



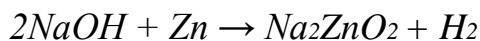
(iv) Acids react with metals oxides to give salt and water.



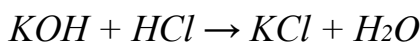
## 6 Chemical properties of Bases-

1. *Reaction with Metals – Certain metals such as Zinc, Aluminum, Tin*

*react with Alkali solutions on heating and hydrogen gas is evolved*



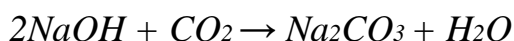
2. *Reaction with acids – Bases react with acids to form salt and water.*



3. *Reaction with Non – metallic oxides –*

*Non - metallic oxides are*

*generally acidic in nature. They react with bases to form salt and water.*



## 7. Strong and Weak Acids

*An acid which completely dissociates into ions in aqueous solution is called strong acid such as HCl, H<sub>2</sub>SO<sub>4</sub>, and HNO<sub>3</sub> etc. Weak acids are those which are weakly dissociated in its aqueous solution such as CH<sub>3</sub>COOH, H<sub>2</sub>CO<sub>3</sub>, and HCN etc. ]*

## 8. Strong and Weak Bases

*A base such as NaOH or KOH which is completely dissociated in aqueous solution is called a strong base. On the other hand a base which is weakly dissociated such as NH<sub>4</sub> OH in its aqueous solution is called a weak base.*

## 9. pH Scale

*The concentration of hydrogen ions in solution is expressed in terms of pH. The pH of a solution is defined as the negative logarithm of hydrogen ion concentration in moles per litre.*

$$\text{pH} = -\log [\text{H}^+]$$

$$\text{pH} = -\log [\text{H}_3\text{O}^+]$$

*where [H<sup>+</sup>] or [H<sub>3</sub>O<sup>+</sup>] represents concentrations of hydrogen ions in solution.*

*For water or neutral solutions, pH = 7*

For acidic solutions,  $\text{pH} < 7$

For basic solutions,  $\text{pH} > 7$

## 10. pH of Salts

(a) pH of salts of strong acid – strong base such as  $\text{NaCl} = 7$

(b) pH of salts of strong acid – weak base such as  $\text{CuSO}_4$  is  $< 7$

(c) pH of salts of weak acid – and strong base such as  $\text{CH}_3\text{COONa} > 7$

## 11. Some Important Chemical Compounds

### (a) Common Salt ( $\text{NaCl}$ )

Sodium chloride is known as common salt. Its main source is sea water. It also exists in the form of rocks and sodium chloride obtained from rocks is called rock salt. Common salt is an important component of our food. It is also used for preparing sodium hydroxide, baking soda, washing soda etc.

### (b) Sodium Hydroxide or Caustic Soda ( $\text{NaOH}$ )

Sodium hydroxide is prepared by passing electricity through an aqueous solution of sodium chloride (also known as brine).



This process is known as chlor-alkali process due to the formation of chlorine and sodium hydroxide (an alkali) as the products.

*Properties –*

1. It is a white translucent solid.
2. It is readily soluble in water to give a strongly alkaline solution.
3. Crystals of sodium hydroxide are deliquescent.

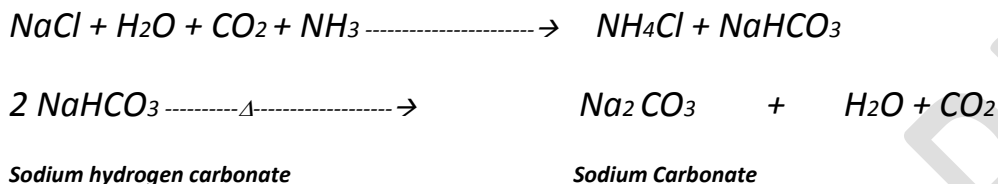
### (c) Bleaching Powder ( $\text{CaOCl}_2$ )



3. It acts as mild antiseptic and antacid.

**(e) Washing soda ( $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ )**

Its chemical name is sodium carbonate decahydrate. It is obtained by heating baking soda in turn is obtained by passing  $\text{CO}_2$  gas through sodium chloride solution saturated with ammonia .



**Recrystallisation of sodium carbonates gives washing soda.**

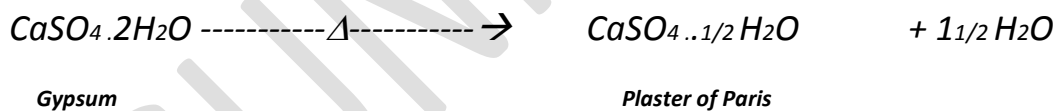


**Uses-**

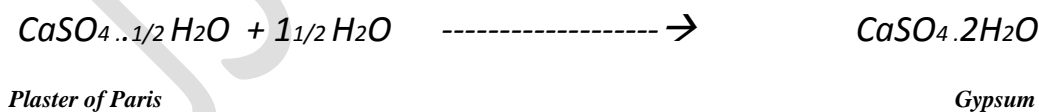
1. It is used in glass, soap and paper industries. 2. It is used for removing permanent hardness of water. 3. It can be used as a cleaning agent for domestic purposes.

**(f)Plaster of Paris ( $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ )**

Its chemical name is calcium sulphate hemihydrate. It is obtained by heating Gypsum upto 373 K.



**On treatment with water it is again converted into gypsum and sets as a hard mass.**



**Uses –**

1. It is used by Doctors for setting fractured bones.  
 2. It is used for making statues, models and other decorative materials.