Chapter - 5

Chemistry in Everyday Life

We see that chemicals are used in each field of life, even all our bioactivities are operated by chemicals soap, detergent, beautiful clothes, various things of household consumption are chemical substances. Cement in making buildings, electrical apparatus, satellites, from motor vehical upto agricultural field, everywhere chemicals are used and theories of Chemistry are used. We use medicines when we fall ill, that is also chemical. Many types of sour-sweet substances, food preservatives are all chemical mixtures. Hence, it is true that daily life can not be imagined without chemicals.

5.1 Acid, base and salt

Sour and bitter taste of food is due to acid and base present in it. In nature, acid, base and salt all these three are found in general form.

Acid- Acids are sour in taste. Acid word is made from latin word **Acidus** which means sour. It is found as acetic acid in vinegar, tartaric acid in tamarind, ascorbic acid in orange, formic acid in sting of red ant, hydrochloric acid in digestive juice etc. The primary property of it is that is turns blue litmus paper into red.

Base- It is bitter in taste and turns red litmus into blue. They show soap like behaviour when touched, like sodium hydroxide , (NaOH) potassium hydroxide (KOH), aluminium hydroxide [$Al(OH)_3$], ammonium hydroxide (NH_4OH) etc. They have ability to neutralise acids and are soluble in water.

Acid and base are soluble in water if quantity of water is more in them, then these are called dilute and if quantity of acid or base is more than water then solution is called concentrated.

Salt- salt and water are formed by the reaction of acid and base.

$$\text{Acid} + \text{base} \rightarrow \text{salt} + \text{water}$$

$$HCl + NaOH \rightarrow NaCl + H_2O$$

This reaction is also called neutralization reaction and is a type of exothermic reaction.Salt formed by strong acid and strong base is neutral. Salts formed by strong acid and weak base are acidic and salts formed by weak acid and strong base are basic.

$$HCl + NH_4OH \rightarrow \underset{\text{acidic salt}}{NH_4Cl} + H_2O$$

$$CH_3COOH + NaOH \rightarrow \underset{\text{basic salt}}{CH_3COONa} + HCl$$

Salts have high melting and boiling point. These are generally found in crystal form. In crystal, crystalline water is also present with these. In writing, unit formula of salt, fixed number of water molecules attached are called crystalline water

Eg. $Na_2CO_3.10H_2O$

Here, 10 water molecules are in crystalline form in sodium carbonate salt.

Eg.

$$CaSO_4.2H_2O,\ K_2SO_4.Al_2(SO_4)_3.24H_2O$$

(Gypsum) (Alum)

5.1.1 Definitions : Many scientists gave many definitions of acid and base.

5.1.1.1 Arrhenius theory : Definition of acid and base was at first given by Arrhenius in 1887. **Those substances which give hydrogen ion (H^+) when decompose in water are called acids and those substances that decompose in water and give hydroxyl ion (OH^-) are called bases.**

examples of acid →

$$HCl_{(aq)} \rightarrow H^+_{(aq)} + Cl^-_{(aq)}$$

Hydrochloric acid

$$HNO_{3\,(aq)} \rightarrow H^+_{(aq)} + NO^-_{3(aq)}$$

Nitric acid

$H_2SO_{4\ (aq)} \rightarrow 2H^+_{(aq)} + SO^{-2}_{4\ (aq)}$

Sulphuric acid

$CH_3COOH \rightarrow H^+_{(aq)} + CH_3COO_{(aq)}$

Acetic acid

$H_2CO_3 \rightarrow H^+_{(aq)} + HCO^-_{3(aq)}$

Carbonic acid

All these are acid because they give H^+ ions in aqueous solution. Here free proton which means hydrogen ion (H^+) is the most reactive, so it reacts with water and remains in form of hydronium ion $H_3O^+_{(aq)}$

$$H^+ + H_2O \rightarrow H_3O^+_{(aq)}$$

Some acids gets completely ionized in aqueous solution, these are called **strong acids**. Eg- HCl, H_2SO_4, HNO_3 etc. Some acids do not completely ionise in aqueous solution and remains in un-dissociated form also. These are called **weak acids.**

Eg- CH_3COOH, H_2CO_3 etc.

Examples of base

$KOH_{(aq)} \rightarrow K^+_{(aq)} + OH^-_{(aq)}$

Potassium Hydroxide

$NaOH \rightarrow Na^+_{(aq)} + OH^-_{(aq)}$

Sodium hydroxide

$Ca(OH)_2 \rightarrow Ca^{+2}_{(aq)} + 2OH^-_{(aq)}$

Calcium hydroxide

$NH_4OH \rightarrow NH^+_{4(aq)} + OH^-_{(aq)}$

Ammonium Hydroxide

All these are bases because they give hydroxyl ion (OH^-) in aqueous solution. Those base which get completely ionized in aqueous solution are called **strong bases.** Eg- KOH, NaOH etc. The base which do not ionize completely are called **weak bases**.

Eg.- NH_4OH, $Mg(OH)_2$ etc. According to Arrhenius, when acid and base react, then H^+ and OH^- ions mutually combine to form water, this reaction is called neutralization. Energy is released in this reaction, so it is called exothermic reaction.

$$H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O$$

Arrehenius theory was useful for those acids and bases which have H^+ and OH^- ions respectively but nature of acids without H^+ ions and bases without OH^- can not be determined, then a new theory was given.

5.1.1.2 Bronsted Lowry concept of acids and bases

This definition of acids and bases was given by Danish chemist Johannes N. Bronsted (1874-1936) and British chemist Thomas M. Lowry (1874-1936). According to Bronsted-Lowry, ''**Acids are proton donors and base are proton acceptor**''. Here they gave concept of conjugate acids and conjugate base.

HA + B	→	A^- +	HB^+
Acid Base		Conjugate base	Conjugate acid

$(HA\text{-}A^-)$ is called acid-conjugate base pair and $(B\text{-}HB^+)$ is called base-conjugate acid pair.

Eg-

$$H_2O + NH_3 \rightleftharpoons NH_4^+{}_{(aq)} + OH^-_{(aq)}$$

Here water is proton donor so it is acid. It gives proton and changes into corresponding base (OH^-) called conjugate base. Ammonia (NH_3) is proton acceptor, so it is base and it accepts proton and changes into ammonium ion (NH_4^+) which is called conjugate acid. These (NH_4^+-NH_3) and (H_2O-OH^-) are called conjugate acid-base pair. These are formed due to presence of a proton or H^+ ion only. Another example is

$$HCl_{(aq)} + H_2O \rightleftharpoons Cl^-_{(aq)} + H_3O^+_{(aq)}$$

These theories do not explain anything about aprotic acids and bases like CO_2, SO_2, BF_3 etc. so the new theory of acid-base was given on the bases of

tron.

5.1.1.3 Lewis concept of acids and bases

In 1923, **Lewis** gave a new theory According to it, **Acids are substances which accept electron pair and base are substances that donates electron pair.** Thus, electron pair acceptor are acids and electron pair donors are bases.

Eg. $BF_3 + :NH_3 \rightarrow F_3B \leftarrow :NH_3$

Acid Base

According to it, Lewis base give electron and lewis acid accept electron to form compound, where both are attached by co-ordinate bond.

According to this theory, electron deficient compound will work like acids and are called lewis acids.

Generally, cations or those compounds whose octet is incomplete are lewis acids.

Eg. $BF_3, AlCl_3, Mg^{2+}, Na^+$ etc

Electron rich or compounds having electron lone pair work as base, are called lewis bases.

Eg. $H_2\ddot{O}, \ddot{N}H_3, OH^-, Cl^-$

In this way, not only H^+ or OH^- containing substances are acids and bases. According to these theories, acidic and basic properties of compounds without hydrogen can also be explained.

5.1.2 General Properties

1. Acid turn blue litmus into red and base turn red litmus into blue.
2. Acids react with metal and produce hydrogen gas.

$$Acid + Metal \rightarrow salt + H_2$$

$$H_2SO_4 + \underset{(Zinc)}{Zn} \rightarrow ZnSO_4 + H_2 \uparrow$$

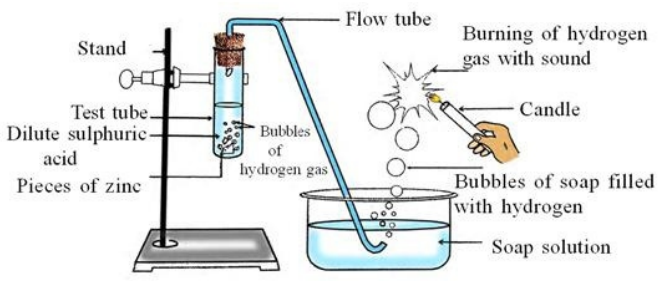


Fig. 5.1 Reaction of metal with acid

This is the reason that sour acidic substances are not kept in metal containers. Zn metal reacts with base NaOH and form salt and hydrogen gas.

$$2NaOH + Zn \rightarrow \underset{sodium\ zincate}{Na_2ZnO_2} + H_2 \uparrow$$

But not all metals on reaction with bases gives H_2 gas.

3. Acid react with metal oxides to gives salt and water.

Metal oxide + acid $\rightarrow$ salt + water

$$CuO + 2HCl \rightarrow CuCl_2 + H_2O$$

Metal oxides react with acid and form salt and water These salts are basic (alkaline) in nature. Non- metallic oxides react with base to form salt and water. These salts are acidic in nature.

Non-metalic oxide + Base $\rightarrow$ salt + water

$$CO_2 + Ca(OH_2) \rightarrow CaCO_3 + H_2O$$

4. Aqueous solution of all acids and bases ae conductors of electricity. These are used as electrolytes.
5. All acids react with bases and loose their properties and become neutral. This reaction is called neutralization.

Acid + Base $\rightarrow$ salt + water

HCl + NaOH $\rightarrow$ NaCl + H_2O

5.1.3 Uses- There are so many uses of acids, bases and salts in our daily life. H_2SO_4, HCl, HNO_3 are also called mineral acids, whereas acids found in natural form in plants and animals are called carbonic organic acids like citric acid, tartaric acid, acetic acid, lactic acid etc. Mineral acids are used in various industries like medicines, paint, fertilizers etc. Hydrochloric acid is used in different industries, in cleaning boiler from inside and in cleaning sink and sanitary specially. Nitric acid is used in making fertilizers and in cleaning gold and silver ornaments. On mixing one part of HNO_3 and three parts of HCl, aqua regia is formed which is very important compound. It can also dissolve metals like gold. Sulphuric acid is used in cells, car batteries and other industries. Sulphuric acid is also called king of acids. Industrial developent rate of any country is measured by consumption of sulphuric acids in different industries. Apart from it, many organic acids like acetic acid is used as vinegar in food products,

preservation of pickle. and also used in cleaning of wood furnitures.

Bases are also used mainly in the industries Sodium hydroxide is used in soap, detergent, paper industries, cloth industries etc. Calcium hydroxide is used to remove acidity of soil. White wash or $Ca(OH)_2$ i.e. lime is a component of insecticide Magnesium hydroxide $[Mg(OH)_2]$ is also called milk of magnesia. It is used as antacid for in removing acidity and constipation of stomach.

There are many uses of salts in daily life, like calcium carbonate $(CaCO_3)$ is used in making floor as marble, in extraction of iron in metallurgy, in making cement etc. We will study uses of washing soda, sodium hydrogen carbonate, sodium chloride in next sections. Silver nitrate $(AgNO_3)$ is mainly used in photography, ammonium nitrate is used in making fertilizers and explosives, alum (phitkari) $(K_2SO_4.Al_2(SO_4)_3.24H_2O)$ is used in the purification of water. In this way there are many salts which are very useful in daily life.

5.2 pH scale

The thermometer is used in measuring the temperature and in similar way pH scale is used in measuring strength of acids and bases.This scale measures concentration of hydrogen ions present in any solution. Here P is taken from a German word potenz i.e. power indicater and H indicates hydrogen ions.

In 1909, **Scientist Sorenson** made pH scale and called exponent of concentration of hydrogen ions as pH. That means, **negative logarithm of concentration of hydrogen ions is called pH.**

$$pH = -\log_{10}[H^+]$$

As free H^+ ions are not present in solution, they combine with water and form hydronium ion $[H_3O^+]$ so value of pH is also

$$pH = -\log_{10}[H_3O^+]$$

More will be the concentration of $[H^+]$ions, less will be the value of pH. The value of pH for neutral solution is 7. For neutral water, concentration of $[H^+]$ and $[OH^-]$ ions is 1×10^{-7} mol/litre so its pH

$$pH=-\log[1\times10^{-7}]$$
$$pH=7\log_{10} \qquad (\log_{10}=1)$$
$$pH=7$$

pH less than 7 = acidic solution

pH 7 = neutral solution

pH from 7 to 14 = basic solution

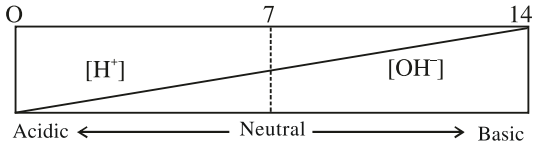
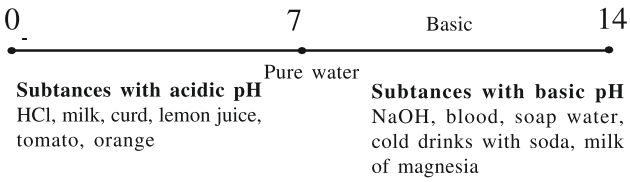


Fig. 5.2 pH Scale

Strength of acid and base depends on concentration of H^+ and OH^- ions in solution. More concentration of H^+ inos show strong acid and more concen tration of OH^- ions show strong base.

pH range of some special solutions



5.3 Importance of pH in daily life - With the knowledge of acidity and basicity, we can face many problems of daily life successfully like as

1. Acidity in stomach - In this problem, stomach faces pain and irritation In this gastric juice having more amount of hydrochloric acid is formed in our stomach which causes pain and burning sense. To get rid of it, antacid which means weak bases like $[Mg(OH)_2]$ milk of magnesia are used. It neutralizes excess amount of acid in our stomach.

2. Tooth decay - Generally pH of mouth is almost 6.5. Bacteria present in the mouth reduce pH of mouth when they react with food remains in teeth by producing acid. Tooth enamel decay when pH value becomes

lower than 5.5 So after eating food, teeth should be cleaned by tooth paste or alkaline solution so that tooth decay can be controlled.

3. Stung of insects - Honey-bee, ant etc insects which have stings when bite us they release acid which comes in contact of our skin. Due to this acid, skin feel pain and burning sense. If at that time alkaline salts like sodium hydrogen carbonate ($NaHCO_3$) are used at that place, then effect of acid will get neutralized.

4. Acid rain- Rain water is considered pure but due to pollutents, its pH is lowering these days. This type of rain is called acid rain. This rain water affects river and soil also. In this way, crop, animal and even whole ecological system is affected. On controlling pollutents, acidic rain can be controlled.

5. pH of soil- By determining the pH of soil, the crops that can be sown in soil can be selected and use of proper fertilizer can also be determined so that good crop is obtained.

5.4. Some useful compounds in everyday life

5.4.1 Sodium chloride (NaCl) :-It is called common salt. It is salt of strong acid and strong base and its pH is 7. Due to 7 pH, its nature is neutral. Industrially, sodium chloride is prepared by drying salty water or ocean water. Salt formed in this way contains many impurities like magnesium chloride ($MgCl_2$), calcium chloride ($CaCl_2$). To obtain it in pure form, hydrogen chloride (HCl) gas is made to flow in large tanks of saturated NaCl solution. In this way, salt (NaCl) is precipitized. Pure precipitized NaCl is then collected.

Properties -

1. It is white solid substance.
2. Its melting point is high 1081 K.
3. It is highly soluble in water.
4. It gets ionised in aqueous solution.

Uses -

1. It is used in food as common salt.
2. It is used in food as preservatives.
3. Freezing mixture is prepared by this.
4. NaOH, Na_2CO_3,$NaHCO_3$, Bleaching powder etc. are formed by using it.

5.4.2 Sodium Hydroxide (NaOH) - It is also called castic soda. Industrially, sodium hydroxide is produced by the electrolysis of sodium chloride. In it, chlorine gas is formed at anode and hydrogen gas at cathode. Sodium hydroxide is obtained in form of solution.

$$2NaCl_{(aq.)} + 2H_2O \rightarrow 2NaOH_{(aq)} + Cl_{2(aq)} + H_{2(g)}$$

Properties -

1. It is a white sleek substance.
2. Its melting point is 591 K.
3. It easily get dissolved in water.
4. It is strong base. In aqueous solution, it remains in ionized form ($Na^+_{(aq)} + OH^-_{(aq)}$) so , it is also strong electrolyte.
5. Its crystals are hygroscopic.

Uses -

1. It is used in making soap, paper, silk industries and other chemicals.
2. It is used in metallurgy of Bauxite.
3. It is used in purification of petroleum.
4. It is used in formation of fats and oils.
5. It is used as laboratory reagent.

5.4.3 Bleaching powder ($CaOCl_2$) - Its chemical name is calcium oxy chloride. It is produced by passing chlorine gas in dry slaked line.

$$Ca(OH_2) + Cl_2 \rightarrow CaOCl_2 + H_2O$$

Calcium Hydroxide

Properties -

1. It is yellow solid substance with sharp smell.
2. It is soluble in cold water.
3. It gives chlorine gas when kept open in air.
4. It gives chlorine gas on reacting with dilute acids.

$$CaOCl_2 + H_2SO_4 \rightarrow CaSO_4 + H_2O + Cl_2 \uparrow$$

$$CaOCl_2 + 2HCl \rightarrow CaCl_2 + H_2O + Cl_2 \uparrow$$

5. Chlorine gas which is released from bleaching powder react with water and form nascent atomic oxygen [O]. This oxygen perform bleaching reaction and behave as oxidizing agent.

$$Cl_2 + H_2O \rightarrow 2HCl + [O] \text{Atomic oxygen}$$

Colured substance + [O] $\rightarrow$ Colourless substance.

Uses -

1. As bleach in cloth industry
2. As bleach in paper industry
3. In purification of drinking water.
4. As oxidizing agent and antibiotic.
5. As reagent in laboratory.

5.4.4 Baking soda ($NaHCO_3$) - It is also called eating soda. Its chemical name is sodium hydrogen carbonate. On mixing it with food substances and heating, CO_2 gas is released as bubbles. In this way food products like cake become soft and spongy and pores are produced in them. Baking soda is made by using NaCl.

$$NaCl+H_2O+CO_2+NH_3 \rightarrow \underset{\text{Ammonium chloride}}{NH_4Cl}+NaHCO_3$$

It is also prepared by passing CO_2 gas in solution of sodium carbonate.

$$Na_2CO_3+CO_2+H_2O \rightarrow 2NaHCO_3$$

Sodium carbonate — Sodium hydrogen carbonate

Properties-

1. It is white crystalline solid.
2. It is hardly soluble in water.
3. Its solution in water is alkaline.
4. CO_2 gas is released on heating it.

$$2NaHCO_3 \xrightarrow{Heat} Na_2CO_3+H_2O+CO_2 \uparrow$$

Uses-

1. As baking powder in food products
2. In making soda water and soda containing cold drink.
3. As antacid to remove acidity of stomach.
4. As mild antiseptic
5. In fire extinguishers
6. As laboratory reagent.

5.4.5 Washing soda ($Na_2CO_3.10H_2O$) -

It is called cloth cleaning soda. Its chemical name is sodium carbonate. In it there are 10 molecules of crystalline water with one molecule of sodium carbonate. It is formed by Solvay's method. In another method, sodium carbonate is obtained on heating baking soda. On its recrystallization, washing soda is obtained.

$$2\ NaHCO_3 \xrightarrow{\Delta} Na_2CO_3+H_2O+CO_2 \uparrow$$

$$Na_2CO_3+10H_2O \xrightarrow{\text{Crystallization}} Na_2CO_3.10H_2O$$

Properties -

1. It is white crystalline solid.
2. Soluble in water.
3. Its solution in water is alkaline.
4. On heating its crystal looses water and get converted into soda ash .

$$Na_2CO_3.10H_2O \xrightarrow{more\ than\ 373K} Na_2CO_3{}^{+}10H_2O$$

Uses -

1. In washing and cleaning
2. In formation of castic soda, baking soda, glass, soap borax.
3. As detergent
4. In paper, paint and textile industry.
5. As laboratory reagent.

5.4.6 Plaster of Paris ($CaSO_4\ ½H_2O$)

Its chemical name is hemihydrate of calcium sulphate. First time it was made in capital of France i.e. Paris, by heating Gypsum so it was named as plaster of Paris. It is also called P.O.P. It is obtained by heating Gypsum at 393 K.

$$2CaSO_4\ 2H_2O \xrightarrow{393K} 2CaSO_4.½H_2O+3H_2O$$

Gypsum — Plaster of Paris

When we heat P.O.P. more than 393K, whole water of crystalline water is removed and dead burnt plaster is obtained.

Properties -

1. It is a while sleek solid substance.
2. On mixing water, in 15 to 20 minutes, it becomes hard and solid.

$$2CaSO_4.½\ H_2O+3H_2O \rightarrow 2CaSO_4.2H_2O$$

P.O.P. — Gypsum

Uses -

1. Its most important use is in making plaster for repairing the cracked bones.
2. In making buildings

3. In dental medicals
4. In making decorative materials like statues.
5. As fire extinguisher substance.

5.5 Soap and detergent

Detergent is a latin word which means" to wipe clean" Soap and detergent are studied in this field.

5.5.1 Soap - The oldest detergent is soap. These are sodium and potassium salts of fatty acids with long carbon chain C_{12} to C_{18} like stearic, palmitic, oleic acid etc. These are made by heating oil or fats with sodium hydroxide or potassium hydroxide. This reaction is called saponification.

$$\begin{array}{l} CH_2\ COOR \\ | \\ CH\ C\ OOR \\ | \\ CH_2COOR \end{array} \quad + 3\ NaOH \longrightarrow \underset{\text{soap}}{3RCOONa} + \quad \begin{array}{l} CH_2\ OH \\ | \\ CH\ OH \\ | \\ CH_2\ OH \end{array}$$

higher fatty acids — glycerol

Soap obtained in this reaction, separates out on mixing sodium chloride. Only those soaps obtained by sodium and potassium salts of higher fatty acids are soluble in water. In these, potassium soaps are more soft. They are used in making shaving soap, shampoo etc. Glycerine is used for making transparent soap.

Soap perform cleaning action in soft water but can not perform it in hard water. In hard water, calcium (Ca^{+2}) and magnesium ions are present, which substitute sodium ion from soap molecule. In this way, calcium and magnesium salts of higher fatty acids are formed. These salts are insoluble in water so they get precipitated. Thus, they can not perform cleaning action. To solve this problem, detergents are used.

5.2.2 Detergent - Detergents are like soap but they work in both soft and hard water. So, generally detergents are used for cleaning.

Detergents are sodium alkyl sulphate and sodium alkyl benzene sulphonate . Apart from these, many types of detergent are found. Here ion of these detergents gets substituted by Ca^{+2} and Mg^{+2} ions and form calcium or magnesium sulphonates. These sulphonates are soluble in water so do not precipitate like soap. So there is no obstacle in cleaning action.

Due to these synthesized detergents, water pollution problem arises because bacteria can not decompose them easily

If R group that is hydrocarbon chain is less branched then they can be decomposed by bacteria easily. So that benzene sulphonate detergents which have long and less hydrocarbon chain are used. At present, to increase ability and productivity of detergents, inorganic phosphate, sodium peroxyborate and some flouroscent compound are also mixed. The cleaning work is done by soap and detergent by micelle formation.

5.2.3 Micelle formation and cleaning action of soap

Soap and detergent perform cleansing action by micelles formation. Firstly, soap molecules like sodium stearate are ionised in water.

$$C_{17}H_{35}COONa \rightarrow C_{17}H_{35}COO^- + Na^+$$

It can also be written as

$$R\ COONa \rightarrow R\ COO^- + Na^+$$

Hydrocarbon part (Hydrophobic) — Polar part (Hydrophillic)

This hydrocarbon tail (R) which is hydrophobic and polar end which is hydrophillic makes such structure. These parts are arranged such that hydrocarbon part is inward and negatively charged polar end is outward.

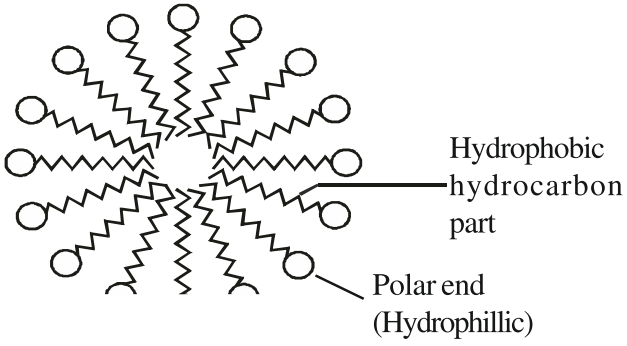


Fig. 5.3 Micelle structure

It is called micelle.

Most of the impurities like oil drop etc are insoluble in water but soluble in hydrocarbon. In cleaning by soap, soap molecules form micelles around impurity. In this, hydrophobic hydrocarbon part attracts impurity and hydrophillic polar part is outward. So, impurity is surrounded and micelle is formed. Polar end present at outer ends are attracted by water and whole impurity is pulled in water.

All micelles are negatively charged (uniformly) so they do not precipitated. Thats why when dirty clothes are treated with soap and then dipped in water, whole impurity of cloth comes out in water.

Important Points

1. According to Arrhenius, those substances which give H^+ ions in aqueous solutions are acid and which give OH^- ions are called base.
2. According to Bronsted and lowry, acids are proton donars and base are proton acceptors.
3. According to Lewis, electron donor are called base and electron accepton are acids.
4. Acid turn blue litmus to red and base turn red litmus to blue.
5. Salt and water are formed by the reaction of acid and base.
6. In crystals of salt, sometimes water of crystallisation is also present.
7. Strength of acid and base is measured by pH.
8. The negative logarithm of concentration of hydrogen ions $[H^+]$ is called pH.
9. If pH of solution = 7, it is neutral, pH < 7 then. acidic and pH > 7 then alkaline.
10. In daily life, many compounds are useful.

    eg. $NaCl, NaHCO_3, Na_2CO_3.10H_2O,$

    $$CaOCl_2, CaSO_4.\frac{1}{2}H_2O$$

11. Soap and detergent are used in cleaning work. These are formed by different types.
12. These do cleaning work by micelle formation.

Practice questions

Objective type questions :

1. Aqueous solution of base
   (a) Turns blue litmus into red
   (b) Turns red litmus into blue
   (c) Turns litmus solution into colourless
   (d) Does not have any effect on litmus solution

2. Solutions of acid and base are, _____ of electricity.
   (a) Insulator (b) Conductor
   (c) Semiconductor (d) No effect

3. pH is negative logarithm of which ions?
   (a) $[H_2O]$ (b) $[OH^-]$
   (c) $[H^+]$ (d) $[Na^+]$

4. Which one is the pH of acidic solution.
   (a) 7 (b) 14
   (c) 11 (d) 4

5. In our stomach, digestion of food occurs in which medium
   (a) Acidic (b) Alkaline
   (c) Neutral (d) Variable

6. In making fire extinguisher, which substance is used-
   (a) Sodium carbonate
   (b) Sodium hydrogen carbonate
   (c) Plaster of paris
   (d) Sodium chloride

7. Washing soda is-
   (a) $NaHCO_3$ (b) $NaCl$
   (c) $CaSO_4.\frac{1}{2}H_2O$ (d) $Na_2CO_3.10H_2O$

8. Which gas is released on keeping bleaching powder open in air-
   (a) H_2 (b) O_2
   (c) Cl_2 (d) CO_2

9. Soap works
   (a) In soft water
   (b) In hard water
   (c) In both soft & hard water

(d) None of these

10. In micelle formation, hydrocarbon tail is
(a) Inward (b) Outward
(c) Variable (d) Towards any side.

11. Compounds which accept proton $[H^+]$
(a) Acid (b) Salt
(c) None of these (d) Base.

Very short type questions

12. Which acid is found in sting of red ant?

13. What are proton donor compounds called?

14. What is neutralisation?

15. How drinking water is made bacteria free?

16. How acid reacts with metallic oxide? Give equation.

17. In pH, what P and H indicates ?

18. Which treatment would we take to get relief from excess acidity produced in stomach?

19. Name two sodium salts.

20. Give definition of base according to Lewis.

21. What is saponification?

22. What is the characteristic of detergents?

23. Which compound is used for plastering cracked bones?

24. In a solution, concentration of hydrogen ion is 1×10^{-4} gm mole L^{-1}. Find pH of solution.

Tell whether solution is acidic or alkaline?

Short type questions

25. Write name and uses of two strong acids and two strong bases.

26. Differentiate soap and detergents?

27. Write definitions of acid and base according to Arrhenius.

28. What is pH? describe pH range of acidic and alkaline solution.

29. What is water of crystallisation? Give example

30. What happens when :

(i) Curd or sour substances are kept in metal utensils.

(ii) Teeth are not cleaned after eating food at night.

31. A compound A reacts with acid H_2SO_4 and release gas B with brisk effervescence. On heating gas B burns with pop sound. Tell names of A and B and give equation of reaction.

Essay type question

32. Explain acid and base according to Bronsted Lowry and Lewis.

33. Write uses of pH in normal life.

34). Write name, method of preparation and uses of-

(i) NaOH
(ii) $NaHCO_3$
(iii) $Na_2CO_3.10H_2O$
(iv) $CaOCl_2$
(v) $CaSO_4.\frac{1}{2}H_2O$

(35) How micelles are formed ? Write mechanism also.

Answer key

(1)	(b)	(2)	(b)	(3)	(c)
(4)	(d)	(5)	(a)	(6)	(b)
(7)	(d)	(8)	(c)	(9)	(a)
(10)	(a)	(11)	(d)		