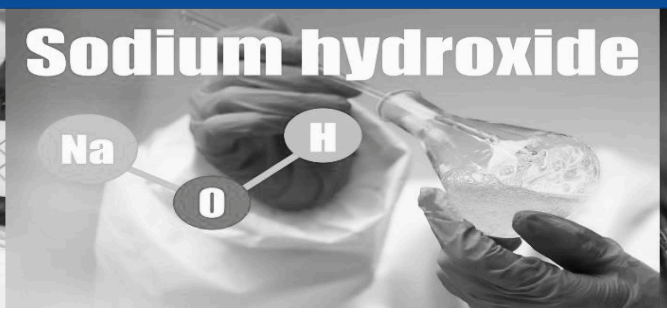
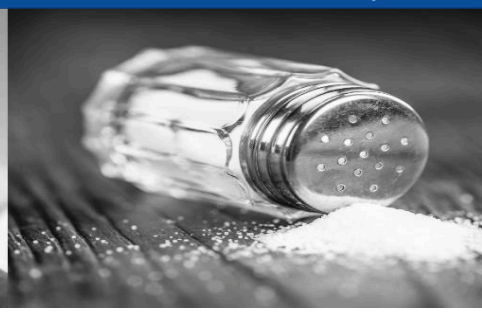




ACIDS, BASES AND SALTS

Concepts Covered

- Classification of Acids, Methods of Preparation of Acids and Bases
- Physical properties of Acids and Bases, Chemical properties of Acids and Bases
- Action of indicators on Acids and Bases, Types of Salts
- Preparation of Salts, Properties of Salts
- Uses of Acids, Bases and Salts

Introduction

In our daily life, we use a large number of edible substances such as lemon, baking soda, tamarind, common salt, sugar, curd and vinegar. Some of these substances taste sour, some taste bitter, some taste sweet and some taste salty. Acids, bases and salts are the three important groups of chemical substances that are used by us in different ways.

Acids, bases and salts are the three important groups of chemical compounds (or chemical substances) which are useful to us in many ways. For example, our stomach makes an acid (hydrochloric acid) which is necessary for the digestion of food; baking soda (sodium hydrogen carbonate) used in baking bread is a base; whereas common salt (sodium chloride) used in cooking food is a salt. Some of the acids, bases and salts occur in nature whereas many acids, bases and salts are made artificially in factories. There are, however, many other chemical compounds (such as water, glucose, cane sugar, urea, etc.) which are neither acids nor bases nor salts.

Acids and Bases

Acid: The term "acid" is derived from the Latin word "acidus" meaning sour to taste.
Example: Sour taste of lemon, unripe grapes, Vinegar, tomatoes etc.

According to Arrhenius Theory:
"An acid is a substance which dissolves in water, it ionizes and releases hydrogen ions $[\mathbf{H}^{+}_{(aq)}]$ in solution".

Note: Hydrogen ion do not exist as $\mathbf{H}^{+}$ions in solution, they attach themselves to the polar water molecules to form hydronium ions or hydroxonium ions, ($\mathbf{H_3O}^{\oplus}$ or $\mathbf{H}^{+}_{(aq)}$).

Base: Substances with a bitter taste and a soapy touch are known as bases. But many bases have corrosive nature.

According to Arrhenius Theory:
Those substances which give hydroxide or hydroxyl ion (OH) in their aqueous solution" are called Bases.

Bronsted - Lowry Concept

Acid: Substances which donate H^+ are Bronsted Lowry acids (H^+ donor)
Base: Substances which accept H^+ are Bronsted Lowry bases (H^+ acceptor)

Types of Acids Based on the Source of Origin

A substance which reacts with a base to form a salt (and water) is called an acid. Acids have a sour taste.

Examples:
Acetic acid, Citric acid, Hydrochloric acid, Sulphuric acid and Nitric acid.
Acids are of two types Organic acids and Mineral acids.

Organic Acids

Many acids are obtained from the parts of plants and some acids are produced by animals also. These are called organic acids due to the fact that their primary sources of origin are living systems. They can also be synthesised in a laboratory.

Example: Lactic acid, Citric acid, Acetic acid.

Acid	Sources
Ascorbic acid	Lemons
Maleic acid	Grapes
Acetic acid	Vinegar
Oxalic acid	Tomato
Citric acid	All citrus fruits
Lactic acid	Curd
Palmitic acid	Palm oil

Fruits which contains Acids

1. Acetic acid is found in vinegar (or sirka). Vinegar is used as a preservative in foods.
2. Formic acid is present in ant's sting. The sharp pain caused by the sting of an ant is due to the formic acid pushed into our skin during the sting.
3. Citric acid is present in citrus fruits such as lemons and oranges.
4. Lactic acid is present in curd and in sour milk.
5. Tartaric acid is present in tamarind (imli), unripe grapes and unripe mangoes.
6. Ascorbic acid is present in amla and citrus fruits (such as lemons and oranges). Ascorbic acid is commonly known as vitamin C.
7. Oxalic acid is present in spinach (palak). Organic acids (or naturally occurring acids) are weak acids. It is not harmful to eat or drink substances containing naturally occurring acids in them. For example, we can eat oranges or drink orange juice which contain natural acids. Similarly, we can consume lemon juice because it contains organic acid (or natural acid) which does not harm us.

Mineral Acids

The acids which are synthesized from the minerals obtained from the earth's crust are called **Mineral acids.**

Example: Hydrochloric acid, Sulphuric acid, Nitric acid.

These mineral acids can be further classified on the basis of various characteristics.

S.No.	Chemical Names	Common Name	Formulae
1.	Hydrochloric acid	Muriatic acid	HCl
2.	Sulphuric acid	Oil of vitriol or king of chemicals	H_2SO_4
3.	Nitric acid	Aqua fortis	HNO_3

We also use mineral acids in our daily life. For example, hydrochloric acid is used in cleaning kitchen sinks and bathroom sanitaryware (like wash basin and toilet seat). Sulphuric acid is used in making storage batteries for cars, buses, trucks and inverters. Nitric acid is used by goldsmiths for cleaning gold and silver ornaments.

Concentrated Acid: - The acid which contains very small amount of water is called a concentrated acid.

Dilute Acid: - The acid which contains more amount of water is called a dilute acid

"Strength of an acid is not dependent upon the concentration of an acid"

Strength of an Acid is directly proportional to Concentration of Hydronium ion.

Classification of Acids and Bases

Based on the constituent elements in the acids, they are classified as Hydracids and Oxyacids. The acids which contain hydrogen and another non-metal are called **Hydracids.** The acids which contain oxygen along with hydrogen and non-metal are called **Oxyacids.**

Various acids and bases differ with respect to the extent of ionization, and hence, they are classified on the basis of ionization.

Strong Acids

The acids which undergo complete ionization when dissolved in water and furnish large concentrations of H^+ are called strong acids.

Weak Acids

The acids which ionize partially and furnish less concentration of H^+ ions, respectively are called weak acids. All organic acids are weak acids.

Strong Bases

The bases which undergo complete ionization when dissolved in water and furnish large concentrations of OH^- are called strong bases.

Weak Bases

The bases which ionize partially and furnish less concentration of OH^- ions, respectively are called weak bases.

Check Your Concept - 1

(i) State the nature of lemon juice.
(ii) Why lemon juice and orange juice taste sour?
(iii) Tina rubs a solution between fingers and feels soapy. what is the nature of that solution?
(iv) Hydrogen ion is common to all acids. True/False

Examples:

Based On: Arrhenius Concept

(1) The characteristics of an acid is:
(A) Turns blue litmus to red. (B) Turns phenolphthalein pink from colourless.
(C) Decompose carbonates (D) oxy compounds of non-metals
Answer: (A), Statement (A) indicates characteristics of acid.

(2) Arrhenius theory of acid-base is not applicable in:
(A) aqueous solution (B) in presence of water
(C) non-aqueous solutions (D) none of the above
Answer: (C), Since Arrhenius theory is only applicable to aqueous medium

Indicators for Testing Acids and Bases

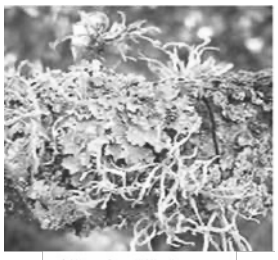
An indicator is a 'dye' that changes colour when it is put into an acid or a base. An indicator gives different colours in acid and base. Thus, an indicator tells us whether the substance we are testing is an acid or a base by change in its colour. A substance which contains an acid is said to be acidic whereas the substance which contains a base is said to be basic. So, we can also say that an indicator tells us whether the substance we are testing is acidic or basic by change in its colour.

Acid-Base indicators are of two types

Natural indicators and Synthetic indicators.
1. Litmus, China rose and Turmeric are naturally occurring indicators.
2. Phenolphthalein is a synthetic indicator.
We will now describe how these indicators are prepared and how they help us in finding out whether a given substance is an acid or a base (acidic or basic).

1. Litmus

Litmus is a natural indicator. Litmus solution is a purple coloured dye which is extracted from a type of plant called 'lichen' (see Figure). Litmus has a purple colour (mauve colour) in water. In other words, when litmus solution is neither acidic nor basic (it is neutral), then its colour is purple. When litmus is added to an acidic solution, it turns red. And when litmus is added to a basic solution, it turns blue. Though the natural colour of litmus is purple, it is made into blue litmus and red litmus for the sake of convenience in detecting colour change when an acid or base is added to it. Thus, litmus is made into two types: Blue litmus and Red litmus. Litmus can be used in the form of litmus solution (like blue litmus solution and red litmus solution) or in the form of strips of litmus paper (blue litmus paper and red litmus paper). The blue litmus paper strip and red litmus paper strip are shown in Figure.


Plant of lichen


(a) Blue Litmus Paper


(b) Red Litmus Paper

Litmus is the most common indicator for testing acids and bases in the laboratory.
1. Acids turn blue litmus to red.
2. Bases turn red litmus to blue.

So, a convenient way to find out whether a solution is acidic or basic is to test it with blue litmus paper and red litmus paper, turn by turn, and observe the change in colour which takes place.
(a) If a drop of the given solution turns blue litmus paper to red, then the given solution will be acidic in nature (or it will be an acid).
For example, a drop of lemon juice turns blue litmus paper to red, so lemon juice is acidic in nature. That is, lemon juice contains an acid.
(b) If a drop of the given solution turns red litmus to blue, then the given solution will be basic in nature (or it will be a base).

For example, a drop of baking soda solution turns red litmus paper to blue, so baking soda is basic in nature. That is, baking soda is a base.

Please note that in order to test a solid substance with dry litmus paper, it is necessary to make a solution of the solid substance in water (otherwise the colour change will not take place). For example, solid baking soda will not turn dry red litmus paper blue. We have to first make a solution of baking soda in water and then use it for testing with red litmus paper. A drop of baking soda solution will turn red litmus paper to blue.

2. China Rose Indicator

China rose is also a natural indicator. China rose is called 'Gudhal' in Hindi. China rose indicator is a light pink coloured solution which is extracted from the red flowers of China rose plant with water (see Figure).

Plant of Gudhal

3. Turmeric as Indicator

Turmeric is another natural indicator. Turmeric is a bright yellow powder obtained from a plant. Turmeric is called 'haldi' in Hindi. Turmeric contains a yellow dye. Turmeric turns red in basic solution. Turmeric is used as an indicator in the form of turmeric paper.

4. Phenolphthalein Indicator

Phenolphthalein is a synthetic (man-made) acid-base indicator.

1. Phenolphthalein indicator is colourless in acid solution.
2. Phenolphthalein indicator gives pink colour in basic solution.

We will be using phenolphthalein indicator when we carry out the neutralisation reaction of an acid and a base. Please note that if we add acid in the solution of a base (which has been turned pink by phenolphthalein indicator), then the solution will change from pink to colourless. This is because acid cancels the effect of base.

There are some substances which have no effect on any indicator. Such substances are neither acidic nor basic. The substances whose solutions do not change the colour of any indicator in any way are called neutral substances. For example, the substances whose solutions do not change the colour of either red litmus or blue litmus are known as neutral substances (they are neither acidic nor basic). Pure water (distilled water), common salt and sugar are neutral substances. So, pure water, common salt solution and sugar solution do not change the colour of any indicator.

Neutral Substances

- The substances that do not have any effect on the colour of any of the indicators are neither acidic nor basic.
- These substances are called neutral substances.
- Some examples of neutral substances are sodium chloride, sugar, etc**.**

Colour change of indicators in acidic, basic and neutral medium:

Indicator	Colour in neutral medium	Colour in acidic medium	Colour in basic medium
Phenolphthalein	Colourless	Colourless	Pink
Methyl orange	Orange	Red	yellow
Litmus	Purple	Red	Blue

Check Your Concept - 2

(i) In acidic solution, litmus paper turns into _____.

(ii) The substances used to test whether a substance is acidic or basic are known as _____.

(iii) Name the acid present in sting of an ant.

(iv) Phenolphthalein becomes colourless in _____ and pink in_____.

(v) Methyl orange is an _____.

Methods of Preparation of Acids and Bases

Acids

1. By direct combination of elements

Acids are mostly prepared by a direct combination of elements.

Example: Hydrogen chloride gas is prepared from hydrogen and chlorine under the action of an electric spark.

$H_2 + Cl_2 \rightarrow 2HCl$

2. By dissolving acidic oxides in water

Some oxides get dissolved in water to form acids. Such oxides are called acidic oxides.

Example: Sulphur trioxide (SO_3) gets dissolved in water to give sulphuric acid (H_2SO_4).

$SO_2 + H_2O \rightarrow H_2SO_4$

Bases

1. From metals

When metals are heated in air or oxygen, they form the oxides of the metals.

Followed by this, when these oxides are dissolved in water, they make the hydroxides of metals, i.e., base.

Examples:

$4Na + O_2 \rightarrow 2Na_2O$
$Na_2O + H_2O \rightarrow 2NaOH$

2. Preparation of slaked lime from quicklime
When quick lime (calcium oxide) reacts with water, it forms slaked lime (calcium hydroxide) with the liberation of heat.
$CaO + H_2O \rightarrow Ca(OH)_2 + heat$

Physical Properties of Acids and Bases

Acids	Bases
Sour taste	Bitter taste
Not Soapy	Soapy/slippery to touch
It turns blue litmus to red	It turns red litmus to blue
They liberated hydronium ions in water	They liberated hydroxyl ions in water

Some Important Chemical Properties of Acids

1. **Reaction with metals:** Some metals displace hydrogen from strong acids (HCl, H_2SO_4 etc.). These are called active metals
   $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$
2. **Reaction with metal oxides:** All dilute mineral acids react with metallic oxides to form their respective metallic salts and water
   $ZnO + H_2SO_4 \rightarrow ZnSO_4 + H_2O$
3. **Reaction with metal carbonates:** This reaction also comes under neutralization but accompanied by the release of CO_2 gas along with the formation of salt and water.
   $CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

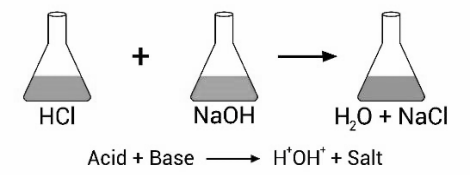
DID you KNOW

The hydrogen gas burns with a pop sound.

Some Important Chemical Properties of Bases

1. Metal hydroxides undergo decomposition on strong heating.
   $\mathbf{Ca(OH)_2 \xrightarrow{\Delta} CaO + H_2O}$
2. Ammonium hydroxide decomposes rapidly to give ammonia gas and water upon slight heating.
   $\mathbf{NH_4OH \xrightarrow{\Delta} NH_3 + H_2O}$

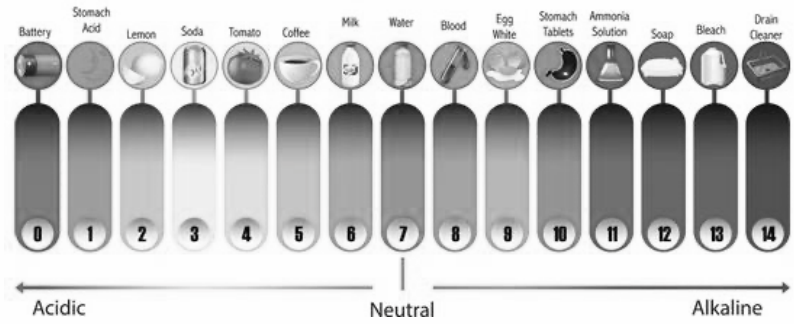
Neutralization Reaction



In a neutralization reaction, one $\mathbf{H^+}$ ion of acid is neutralised by one $\mathbf{OH^-}$ ion of base. When all the $\mathbf{H^+}$ ions in the acidic solution are neutralised by the same number of $\mathbf{OH^-}$ ions of basic solution, it is called complete neutralisation.

Extended Learning

pH SCALE –



S.P.L. Sorenson, a Danish Chemist in 1909 introduced the concept of measuring the concentration of hydrogen ions ($H^+(aq)$] in a particular solution., The p in pH stands for 'poterz' in German, meaning power. on the pH scale we can measure pH from "0" (very acidic) to 14 (very alkaline).

Neutralization in Everyday Life

1. Indigestion


Acidity in Stomach

Our stomach produces hydrochloric acid. This hydrochloric acid helps in digesting our food without harming the stomach. Sometimes, excess of hydrochloric acid is produced in the stomach due to various reasons (one being over-eating). The excess of acid in the stomach causes indigestion which produces pain and irritation (The person who has excess acid in the stomach is also said to suffer from acidity). In order to cure indigestion and get rid of pain, we can take bases called 'antacids' ('antacid' means 'anti-acid').

Antacids are a group of mild bases which have no toxic effects on the body. Being basic in nature, antacids react with excess acid in the stomach and neutralize it. This gives relief to the person concerned. A common antacid used for curing indigestion due to acidity is milk of magnesia. Milk of magnesia contains a base called magnesium hydroxide. Magnesium hydroxide neutralizes the excess acid present in the stomach and cures indigestion. Another antacid is baking soda. Baking soda contains a base called sodium hydrogen carbonate. Antacids are available in the market in the form of liquid mixtures or tablets.

2. Ant's Sting


Ant's Sting

The sting of an ant contains an acid called formic acid. So, when an ant stings (or bites) a person, it injects an acidic liquid into the skin of the person which causes burning pain. If an ant stings a person, then rubbing a mild base like baking soda solution (or calamine solution) on the stung area of the skin gives relief. This is because, being a base, baking soda solution (or calamine solution) neutralizes the acidic liquid injected by the ant and cancels its effect. Please note that calamine solution contains a base called zinc carbonate.

3. Soil Treatment


Soil Treatment with the help of tractor

The soil may be acidic or basic naturally. The plants do not grow well if the soil at a place is too acidic or too basic. The excessive use of chemical fertilizers in the fields also makes the soil too acidic. When the soil is too acidic, it is treated with bases such as quicklime (calcium oxide) or slaked lime (calcium hydroxide). The bases such as quicklime (or slaked lime) neutralize the excess acid present in the soil and reduce its acidic nature. Thus, a farmer should add quicklime (or slaked lime) in the fields if the soil is too acidic. Sometimes, however, the soil is too basic. If the soil is too basic, then decaying organic matter (called manure or compost) is added to it. The decaying organic matter releases acids which neutralize the excess bases present in the soil and reduce its basic nature. Thus, a farmer should add decaying organic matter (manure or compost) in his fields if the soil is too basic.

4. Factory Wastes


Factory Wastes

The waste substances discharged by many factories contains acids. If these untreated factory wastes are discharged into water bodies (like lakes, ponds, and rivers, etc.), then the acids present in them will kill the fish and other aquatic organisms which live in the water bodies. The acidic factory wastes should be treated with basic substances to neutralize them before discharging them into water bodies (such as lakes, ponds and rivers, etc.).

Salt

Salt is a substance which contains positive and negative ions or radicals and ionizes completely in its aqueous solution. These are formed by a neutralization reaction.

$$\text{Acid} + \text{Base} \xrightarrow{\text{Neutralization}} \text{Salt} + \text{Water}$$

Types of Salts

1. Normal Salts:
2. Acidic Salts:
3. Basic Salts:

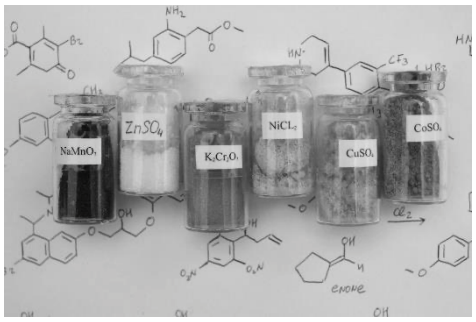
Preparation of Simple Salts

Sodium chloride is prepared by the neutralization of sodium hydroxide with hydrochloric acid.

1. $\underset{\text{Sodium hydroxide}}{\text{NaOH}} + \text{HCl} \rightarrow \underset{\text{Sodium chloride}}{\text{NaCl}} + H_2O$

Properties of Salts

1. Salts are mostly solids.
2. Salts are ionic compounds. Hence, they have high melting points and boiling points.
3. Salts are usually soluble in water
4. Just like acids and bases, the salt solution also conducts electricity due to the presence of ions in them.
5. Salts of sodium and potassium are colorless, whereas salts of iron, copper, chromium, etc., are coloured.
6. Salts have high melting points
7. The aqueous solutions of salts are good conductors of electricity. Hence, they are called electrolytes.



Check Your Concept - 3

(i) What are salts? Give an example.

(ii) Salt may be _____, _____ or _____in nature.

Hydrated Salts

Generally, salts are found as crystals with water molecules present in them. This water is called water of crystallization and such salts are called hydrated salts.

Examples:

Copper sulphate crystal contains five molecules of water per molecule. The formula is $CuSO_4 \cdot 5H_2O$. This water of crystallization gives the crystal its shape.

- Water of crystallization also gives colour to some crystals.
- On heating, hydrated salts lose their water of crystallization and as a result, of which the crystals lose their shape and colour and change to a powdery substance.
- The hydrated salts that have lost their water of crystallization are called anhydrous salts.
- When hydrated copper sulphate is heated, it gives out water molecules to form white powdery anhydrous copper sulphate, which on addition of water again converts to hydrated copper sulphate.

Uses of Acids, Bases and Salts

Acids

- Sulphuric acid is used in the manufacture of fertilizers, paints, chemicals, plastics, detergents, etc.
- Nitric acid is used in the manufacture of fertilizers, explosives, dyes and plastics.
- Hydrochloric acid is used to remove oxide film from steel objects as well as scale deposits from within boilers. It's also used in dyestuffs, textiles, food, and leather.

Bases

The following are some of the most important applications of bases:

- Sodium hydroxide is used in the production of soap, paper, and rayon, a synthetic fibre.
- Calcium hydroxide (also known as slaked lime) is used in the production of bleaching powder.
- Magnesium hydroxide is used as an antacid to neutralize excess stomach acid and cure indigestion.
- Sodium carbonate is used to soften hard water and as a washing soda.
- Sodium hydrogen carbonate is used in baking soda, baking powders, as an antacid to treat indigestion, and in soda-acid fire extinguishers.

Salts

- Common salt is used as a raw material for making a large number of useful chemicals in the industry such as sodium hydroxide, sodium carbonate, sodium hydrogen carbonate, hydrochloric acid, chlorine, hydrogen and sodium metal.
- Common salt is used in cooking food.
- Common salt is used as a preservative in pickles, and in currying meat and fish.
- Common salt is used in the manufacture of soap.
- Washing soda is a transparent crystalline solid.
- Sodium carbonate is used in the manufacture of sodium compounds such as borax.
- Sodium hydrogen carbonate is used as an antacid in medicine to remove the acidity of the stomach.

Solved Examples

(1) **What are indicators?**
Answer: Those substances which change their colour in different types of substances are called indicators.

(2) **What is litmus solution?**
Answer: It is purple dye which is extracted from a plant 'lichen'. It is used as acid-base indicator.

(3) **Name flowers whose colour or petals can be used as indicator.**
Answer: Hydrangea, Petunia, Geranium.

(4) **What are phenolphthalein and methyl orange?**
Answer: Synthetic indicators.

(5) **What is the colour of methyl orange in NaOH?**
Answer: Yellow.

(6) **Buttermilk spoils if kept in a copper or brass container.**
Answer:
- Buttermilk contains an organic acid called as lactic acid.
- The lactic acid reacts with copper and brass and forms toxic compounds which are not fit for consumption.
- They are harmful and may cause food poisoning.
- So, it is not advisable to keep buttermilk in brass or copper containers.

(7) **Blue litmus paper is dipped in a solution. It remains blue. What is the nature of the solution? Explain.**
Answer: The solution is either basic or neutral. This is because basic and neutral solutions do not change the colour of blue litmus paper (Only acids turn blue litmus paper to red).

(8) **(1) Give the constituents of baking powder**
(2) Why does cake or bread swells on adding baking powder?
Answer: (1) Baking powder contain sodium hydrogen carbonate and tartaric acid.
(2) It is due to carbon dioxide.

(9) **Crystals of a substance changed their colour on heating in a closed test tube but regained it after sometime when they were allowed to cool down. Name the substance and write its formula and explain the phenomenon involved.**
Answer: $CuSO_4.5H_2O$ is a blue crystalline solid. It becomes dirty white on heating due to loss of water molecules and it becomes amorphous.
It regains its colour by absorbing water from atmosphere and becomes blue in colour.

(10) **What is tooth enamel chemically? State the condition when it starts corroding. What happens when food particles left in the mouth after eating degrade? Why do doctors suggest use of tooth powder/toothpaste to prevent tooth decay?**
Answer: It is made up of calcium phosphate.
It starts corroding due to acid formed in mouth. The food particles which are left in mouth form acids which cause tooth decay. Toothpaste and tooth powder are basic and neutralize acid formed in mouth which prevents tooth decay.

Exercise

FILL IN THE BANKS

(1) Ammonium hydroxide on heating gives _____ and _____.
(2) Zinc on reaction with dilute sulphuric acid liberates _____ gas.
(3) Methyl orange turns lime water _____.
(4) The salt formed by the removal of water of crystallization from hydrated salt is called _____.
(5) _____feels slippery to touch.
(6) Distilled water is_____ in nature.
(7) Bases turn_____litmus_____.
(8) _____is/are formed during a neutralization reaction.
(9) The substances used to test whether a substance is acidic or basic are known as _____.
(10) Salt and water are produced in neutralization process with the evolution of _____.

TRUE OR FALSE

(1) Carbonic acid is a strong acid.
(2) Sulphur dioxide on hydrolysis gives sulphuric acid.
(3) Acids turn methyl orange solution to pink.
(4) Ammonium hydroxide is an alkali.
(5) Lead sulphide is a normal salt.
(6) Formula of washing soda is $Na_2CO_3.7H_2O$.
(7) Nitre is the common name of sodium nitrate.
(8) Indicator is a substance which shows different colour with acids and bases.
(9) The reaction between hydrochloric acid and sodium hydroxide will form salt and water
(10) Turmeric is a synthetic indicator

OBJECTIVE TYPE QUESTIONS

(1) Identify the organic acid among the following given acids:
(A) hydroiodic acid (B) nitrous acid
(C) carbonic acid (D) stearic acid

(2) Which among the following acids is present in lemons:
(A) acetic acid (B) oleic acid
(C) stearic acid (D) ascorbic acid

(3) Which among the following is a strong acid:
(A) acetic acid (B) sulphurous acid
(C) carbonic acid (D) nitric acid

(4) Among the following, which substance turns phenolphthalein to pink:
(A) soda water (B) lime water
(C) common salt (D) sugar solution

(5) Which among the following is a hydrated salt:
(A) marble (B) baking soda
(C) green vitriol (D) all the above

(6) Salt used in the purification of water is:
(A) potash alum (B) gypsum salt
(C) green vitriol (D) blue vitriol

(7) Which among the following is the application of neutralization:
(A) Farmers add slaked lime to the soil.
(B) Persons suffering from acidity are given antacid tablets.
(C) Usage of lithium hydroxide in submarines.
(D) All the above.

(8) Identify the organic acid among the following given acids:
(A) Hydroiodic Acid (B) Nitrous Acid
(C) Carbonic Acid (D) Stearic Acid

Answer Key

CHECK YOUR CONCEPT

(1) (i) Acidic (iii) Solution (iv) True
(2) (i) Red (ii) Indicator (iii) Formic Acid (vi) Indicator
(3) (iii) Acidic, Basic Neutral

FILL IN THE BLANKS

(1) Ammonia, water
(2) Hydrogen
(3) Yellow
(4) Anhydrous acids
(5) Base or alkali
(6) Neutral
(7) Red, Blue
(8) Salt/Salts
(9) Indicators
(10) Heat

TRUE OR FALSE

(1) False
(2) False
(3) True
(4) True
(5) True
(6) False
(7) False
(8) True
(9) True
(10) True

OBJECTIVE TYPE QUESTIONS

(1) (D)
(2) (D)
(3) (D)
(4) (B)
(5) (C)
(6) (A)
(7) (D)
(8) (D)