

# 4

## Chapter

# Acids, Bases and Salts

We'll cover the following key points:

- Acids and its Classification
- Bases and its Classification
- Neutralization in Everyday Life
- Salts



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## Learning Outcomes

**By the end of this chapter, students will be able to:**

- Understand the concept of acids, bases, and salts and their significance in daily life.
- Explain the classification of acids (organic and mineral acids) and bases (strong and weak bases).
- Describe the process of neutralization and its applications in everyday life, such as in antacids and soil treatment.
- Identify the properties, preparation, and uses of salts in various industrial and household activities.

## Guidelines for Teachers

The teacher can begin the chapter by explaining the basic properties of acids, bases, and salts using common household examples like vinegar, soap, and table salt. Simple experiments, such as testing substances with litmus paper or demonstrating neutralization with lemon juice and baking soda, can make concepts relatable. Visual aids and activities showing the classification of acids and bases can enhance understanding. Linking the concept of neutralization to real-life applications, such as treating acidic soil or stomach acidity, can engage students and highlight the practical relevance of the topic.

## NCF Curricular Goals and Competencies

**This chapter aligns with the following curricular goals and competencies:**

CG-2 (C 2.3): Explores the chemical properties and classifications of acids, bases, and salts through observation and experimentation.



## Mind Map

# ACID BASE AND SALT

## Acid and Base

- **Acid:** They are sour in taste.
- **Base:** They are bitter in taste

Name of acid	Found in	Name of base	Found in
Acetic acid	Vinegar	Calcium hydroxide	Lime water
Formic acid	Ant's sting	Ammonium hydroxide	Window cleaner
Citric acid	Citrus fruits such as oranges, lemons, etc.	Sodium hydroxide / Potassium hydroxide	Soap
Lactic acid	Curd	Magnesium hydroxide	Milk of magnesia
Oxalic acid	Spinach		
Ascorbic acid (Vitamin C)	Amla, Citrus fruits		
Tartaric acid	Tamarind, grapes, unripe mangoes, etc.		

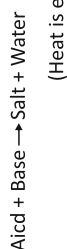
## NATURAL INDICATORS

- **Indicators:** The substances are used to test whether a substance is acidic or basic.
- **Types of natural Indicators**
  - ✓ Litmus extracted from lichens.
  - ✓ China rose petals
  - ✓ Turmeric

Indicator	Colour in acid	Colour in Base
Red Litmus	No change	Blue
Blue Litmus	Red	No change
China rose petals	Red	Green
Turmeric	No change	Reddish Brown

## Neutralisation

- The reaction between acid & base is known as neutralization salt and water are produced in this process with the evolution of heat.



## Neutralisation in everyday life

- Indigestion:** Undigested food causes acidity in stomach to relieve milk of magnesia is taken to neutralise acid.
- Ant bite :** When an ant bites, it injects the acid (formic acid). it can be neutralised by rubbing baking soda.
- Soil treatment:** Excessive use of chemical fertilisers makes the soil acidic. It is treated with bases like quick lime or slaked lime.
- Factory wastes:** The wastes of many factories contain acids. The factory wastes are, therefore, neutralised by adding basic substances.

## Introduction:

We all are familiar with the sour, bitter and salty tastes of different edible substances. Let us list some of these common substances and their tastes in the table given below :

Substances	Tastes
Lemon juice	Sour
Orange juice	Sour
Vinegar	Sour
Curd	Sour
Tamarind (imli)	Sour
Common salt	Salty
Amla	Sour
Baking soda	Bitter
Unripe mango	Sour

## In history...

- **Discovery of Acidic Nature of Lemon Juice (17th Century):** Scientists in the 17th century discovered the acidic properties of lemon juice, marking the beginning of the study of natural acids. This led to the identification of various naturally occurring acids, such as citric acid and acetic acid.
- **Lavoisier and the Study of Acids (18th Century):** Antoine Lavoisier, a prominent chemist, began studying substances with sour tastes and named them "acids." His work paved the way for understanding the behavior of acids and bases in chemistry.

## Acids and its Classification

Riya and Kabir are doing a science experiment.



The sour, bitter and salty tastes of these substances are due to the acidic, basic and salty nature of these substances.

## Did You Know ?

The word "acid" is derived from the Latin word "acidus," which translates to "sour" in English. This name reflects the characteristic taste of many acids, such as vinegar and lemon juice, which are known for their sourness. In ancient times, substances with a sharp or tangy flavor were often associated with this term. The discovery and study of acids have played a significant role in chemistry, as they are involved in countless natural and industrial processes.

## Acids

All sour-tasting materials contain acids. The chemical nature of these substances is acidic. Thus, acids are the substances having sour tastes. Examples are curd, lemon juice, orange juice, vinegar, etc. The acids in these substances are **natural acids**. Some of the common natural acids and the substances which contain these acids are given in the following table :

Name of acids	Found in substances
Formic acid	Ant's sting
Acetic acid	Vinegar
Citric acid	Citrus fruits (lemons, oranges, etc.)
Lactic acid	Milk, curd
Ascorbic acid	Amla
Tartaric acid	Unripe mango, turmeric, etc.
Oxalic acid	Spinach

## Classification of Acids

Acids can be classified as **mineral acids and organic acids**.

- Hydrochloric acid ( $\text{HCl}$ ), sulphuric acid ( $\text{H}_2\text{SO}_4$ ) and nitric acid ( $\text{HNO}_3$ ) are the mineral acids. These are the strong acids.
- Naturally occurring acids like formic acid, acetic acid, lactic acid, etc. are the organic acids. These are the weak acids.

Acids can also be classified as **concentrated and dilute acids**.

- If maximum amount of acidic gas is dissolved in minimum amount of water, then the concentration of the resulting solution is maximum and this solution is concentrated solution.

One can prepare the dilute solution of different strengths by slowly adding the requisite amount of concentrated acid in the fixed amount of water.

## KEYWORDS

**Natural Acids:** Organic acids found in nature, such as citric acid in lemons or acetic acid in vinegar, are often used in cooking, preservation, and cleaning due to their acidic properties.

## Physical Properties of Acid

Following are some of the physical properties of acids:

- Acids taste sour.
- Acids turn blue litmus paper red.
- Acidic solutions conduct electricity.
- Acids are corrosive in nature.
- Acids are readily soluble in water and produce a lot of heat.

## Uses of Acids

Concentrated hydrochloric acid (HCl), sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) and nitric acid (HNO<sub>3</sub>) are used in a large number of metallurgical operations, manufacture of fertilizers and preparation of a large number of industrial chemicals. These acids are also used in laboratories.

Following are some of the important uses of these acids :

### Hydrochloric Acid (HCl)

It is used as an important laboratory reagent.

- It is used to prepare aqua regia (3 parts HCl and 1 part HNO<sub>3</sub>) to dissolve metals like gold and platinum.
- It is used in the **textile and dyeing industries**.
- It is used in the manufacture of chlorides and chlorine.
- It is used to remove scales formed inside the **boilers**. This process is called descaling.
- It is used to clean metals and remove rust in metal industries.
- It Helps in food preparation and preservation.
- It is the Key component in producing PVC, fertilizers, and dyes.

### Sulphuric Acid (H<sub>2</sub>SO<sub>4</sub>)

It is used in the laboratory as an important reagent.

- It is used in storage batteries.
- It is used in the textile, paper and dyeing industries.
- It is used in refining petroleum.
- It is used in the manufacture of fertilizers like ammonium sulphate and calcium superphosphate.
- Chemical Manufacturing: Produces detergents, paints, and synthetic fibers.
- Metal Processing: Used in the pickling of steel to remove **oxidation**.

**Indicator:** We cannot taste every substance as every substance is not edible. In such cases the nature of substances can be determined by the use of special type of substances called indicators. Indicators are the substances which change the colour of the solution of acidic or basic substances when added in these solutions. Turmeric, litmus, China rose petals (Gudhal), etc., are some of the naturally occurring indicators.

## Natural Indicators Around Us

### Litmus : A natural dye

- Litmus is the most commonly used **natural indicator**.
- It is extracted from lichens.
- It has a purple colour in distilled water (neutral water).
- It turns red when added to an acidic solution and blue when added to a basic solution.
- It is available in the form of a solution, or in the form of strips of paper, known as litmus paper.
- Generally, it is available in two colours : blue litmus paper and red litmus paper.
- Blue litmus paper turns red when dipped in acidic solution and red litmus paper turns blue when dipped in basic solution.



Red and blue litmus paper

### Turmeric: another natural indicator

- Turmeric (haldi) can also be used as an indicator.
- It is the most commonly used spice in our kitchen.
- Turmeric, the root of turmeric plant, is a yellow coloured substance.
- Its colour is pink in acidic solution and brick red in basic solution.

Let us prepare the turmeric paper from turmeric powder in the following activity:



### Activity

**Aim :** To demonstrate turmeric as an indicator

**Materials required :** Turmeric powder, dishwashing powder, vinegar, water, three small bowls, two pieces of tissue paper, and a cotton earbud.

#### Method:

1. Put some turmeric powder in a bowl.



### KEYWORDS

**Natural indicator:** A natural indicator is a substance obtained from plants or natural sources that changes color in response to the acidity or basicity of a solution.

2. Add a little water to make a smooth paste.
3. Smear the paste evenly over both the tissue papers and let them dry completely.
4. Take small amounts of dishwashing solution and vinegar in separate bowls.
5. Use a cotton earbud to draw a flower on one dried yellow tissue paper with vinegar and the other with soap solution. What do you see?

**Observation :** The flower drawn with vinegar is not visible whereas the one drawn with soap solution turns red. How does this occur?

**Explanation :** **Curcumin**, an active ingredient of turmeric, acts as an indicator. It remains yellow in acidic (vinegar) or neutral solutions and turns red in basic solutions (soap solution).

### China Rose: Yet another natural indicator

- China rose (Gudhal) is also a natural indicator.
- It is extracted from the red flowers of China rose plant with warm water.
- Its colour is light pink in neutral solution which changes to green in basic solution and deep pink (magenta) in acidic solution.



### Activity

**Aim :** To demonstrate whether a substance is acidic, basic, or neutral using red cabbage juice as an indicator.

**materials required:** Red cabbage juice, vinegar, ammonia, distilled water, and three test tubes.

**Method:** Take vinegar, **ammonia**, and distilled water in the test tubes. Put a few drops of red cabbage juice in each test tube. Note the colour change.

**Observation :** You will see that vinegar turns red, ammonia turns greenish-yellow, and the distilled water turns purple.

### Methyl orange and phenolphthalein

Methyl orange and phenolphthalein are the two most commonly used synthetic indicators. Given below table shows the colours of these indicators in basic, neutral and acidic medium.

#### KEYWORDS

**Curcumin:** A natural yellow pigment found in turmeric, known for its antioxidant and anti-inflammatory properties.

**Ammonia:** A colorless gas with a pungent smell, consisting of nitrogen and hydrogen ( $\text{NH}_3$ ), commonly used as a cleaning agent and in fertilizers.

Indicators	Colour of solution		
	Basic	Neutral	Acidic
Litmus	Blue	Violet	Red
Turmeric	Red	Yellow	Pink
China rose	Green	Light pink	Dark pink
Methyl orange	Yellow	Orange	Pink
Phenolphthalein	Pink	Colourless	Colourless

## Let's recall what we know

### Apply Concept in Context

Apply

- Explain why some substances, like lemons, taste sour.
- How does the classification of an acid help us understand its properties?

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking

### Examine Further

Analyse

- Research the different types of acids found in fruits and their properties.
- How can we tell if a substance is an acid without tasting it?
- Compare the properties of weak acids, like vinegar, and strong acids, like hydrochloric acid.

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking, Research

### Self-Assessment Questions

Evaluate

- Define an acid and describe its basic properties.
- Identify any acidic substances in your home. What makes them acidic?

**Skills Covered:** Evaluation, Logical thinking

### Creative Insight

Create

List ten substances you find at home and classify them based on whether they are acidic or not. Present this information creatively in a table with columns for substance name, acid/base classification, and use.

**Skills Covered:** Creativity, Critical and logical thinking, Observation, Organization

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## Bases and its Classification

Riya and Kabir are in the kitchen



Bases can be classified as strong and weak bases. Following are the examples of strong and weak bases :

### Strong Bases

- Sodium hydroxide (NaOH)
- Potassium hydroxide (KOH) etc.

### Weak Bases

- Magnesium hydroxide ( $\text{Mg}(\text{OH})_2$ )
- Ammonium hydroxide ( $\text{NH}_4\text{OH}$ ) etc.

### Properties of Bases

- Bases have bitter taste and soapy touch.
- They turn red litmus paper into blue.
- Bases react with acids to form salt and water.

### Uses of Bases

Uses of some of the important bases are as follows:

**Calcium hydroxide** is a strong base and commonly known as slaked lime.

- It is the important constituent of many pesticides used in agriculture.
- It is used for neutralizing acidic soil.
- It is used as a substitute for cement in low cost construction.

**Sodium hydroxide** is also a strong base and is commonly known as caustic soda. Its important uses are as follows:

- It is used as a laboratory reagent.
- It is used in laboratory for the absorption of gases like  $\text{CO}_2$ ,  $\text{SO}_2$ , etc.
- It is used in the refining of vegetable oils.

**Potassium hydroxide** is commonly known as caustic potash. Its important uses are as follows:

- It is used as absorbent for  $\text{CO}_2$ .
- It is used in the manufacture of soft soap.
- It is used in the preparation of biodiesels.

**Magnesium hydroxide** is also known as milk of magnesia. It is used as antacid.

### Ammonium hydroxide

Its important uses are as follows:

- It is used in the manufacture of household cleaners and many other chemicals.
- It is used in the manufacture of ammonium nitrate fertilizer.

The taste of base is bitter. For example, the taste of baking soda is bitter. On rubbing the aqueous solution of baking soda between fingers, we feel soapy. This type of substances which are bitter in taste and feel soapy on touching are called bases. Thus, bases are the substances which taste bitter and feel soapy on touching. Examples are soap, baking soda, etc. The chemical nature of these substances is basic. Some of the common bases and the substances which contain these are listed in the following table :

Name of bases	Found in substances
Sodium hydroxide and potassium hydroxide	Soap
Calcium hydroxide	Lime water
Magnesium hydroxide	Milk of magnesia
Ammonium hydroxide	Window cleaner

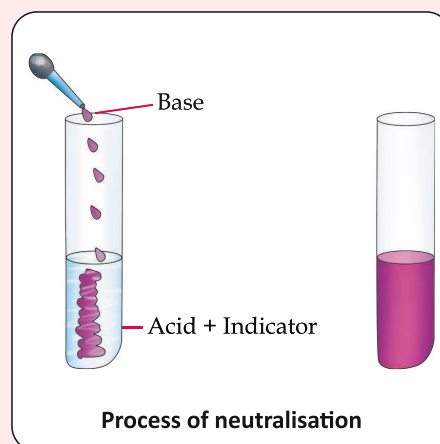
### Alkalis

Water soluble bases are called alkalis. Examples are sodium hydroxide, potassium hydroxide, etc.

### Activity

#### To be demonstrated by the teacher in the class

Fill one-fourth of a test tube with dilute hydrochloric acid. Note down its colour. Note down the colour of phenolphthalein solution also. Add 2–3 drops of the indicator to the acid. Now shake the test tube gently. Do you observe any change in colour of the acid? Add to the acidic solution a drop of sodium hydroxide solution by a dropper.



## Let's recall what we know

### Apply Concept in Context

Apply

- How does a weak base and a strong base differ in their chemical properties and behavior in water?
- If a cleaning product contains a strong base, how might it affect different materials in your home and why?

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking

### Examine Further

Analyse

- Research the role of bases in household cleaning products.
- Compare how acids and bases are used in everyday life.

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking, Research

### Self-Assessment Questions

Evaluate

- Define a base and explain how it is different from an acid.
- List a few common bases you use in daily life. What are their uses?

**Skills Covered:** Evaluation, Logical thinking

### Creative Insight

Create

Create a chart with ten common household substances. Categorize them based on whether they are acidic, basic, or neutral, and add a note about their everyday use.

**Skills Covered:** Creativity, Critical and logical thinking, Brainstorming, Observation, Organization

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## Neutralization in Everyday Life

Meera and her father are watching a cooking show.

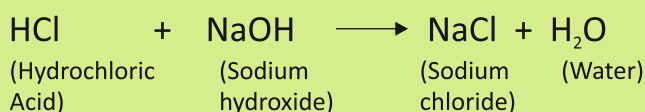


## Neutralisation

Neutralization is the reaction between an acid and a base forming salt and water with the evolution of heat. When an acid solution and a base solution are mixed in suitable amounts, both the acidic nature of the acid and the basic nature of the base are destroyed. The resulting solution is neither acidic nor basic. Thus, the neutralization reaction has taken place.

**Acid + Base → Salt + Water (Heat is evolved)**

Examples are :



## Neutralisations in Everyday Life

### Soil Treatment

Excessive use of chemical fertilizers makes the soil acidic. Plants do not grow well when the soil is either too acidic or too basic. When the soil is too acidic, it is treated with bases like quick lime (calcium oxide) or slaked lime (calcium hydroxide). If the soil is basic, organic matter is added to it. Organic matter releases acids which neutralises the basic nature of the soil.

### Ant bite treatment

When an ant bites, it injects the acidic liquid (formic acid) into the skin. The effect of the acid can be neutralised by rubbing moist baking soda (sodium hydrogen carbonate) or calamine solution, which contains zinc carbonate.

### Treatment of Indigestion

Hydrochloric acid is produced in the stomach to digest the food. But if too much acid is produced in the stomach, it causes indigestion. Indigestion can be treated by taking antacid like milk of magnesia which contains magnesium hydroxide. It neutralises the effect of excessive acid.

## Let's recall what we know

### Apply Concept in Context

Apply

- Provide two examples of neutralization reactions that are useful in cooking.
- How does neutralization help in reducing acidity?

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking

### Examine Further

Analyse

- Research how neutralization is important in reducing acidity in soil for agriculture.
- What other neutralizing agents are used in daily life?
- How does neutralization help when you have an upset stomach?

**Skills Covered:** Critical and logical thinking, Brainstorming, Applicative thinking, Research

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## Self-Assessment Questions

Evaluate

- Define neutralization and explain its importance.
- What is one example of a neutralization process used in healthcare?

**Skills Covered:** Evaluation, Logical thinking

## Creative Insight

Create

Create a diagram that shows a neutralization reaction between an acid and a base. Label each part and explain how the reaction proceeds.

**Skills Covered:** Creativity, Critical and logical thinking, Brainstorming, Observation, Organization

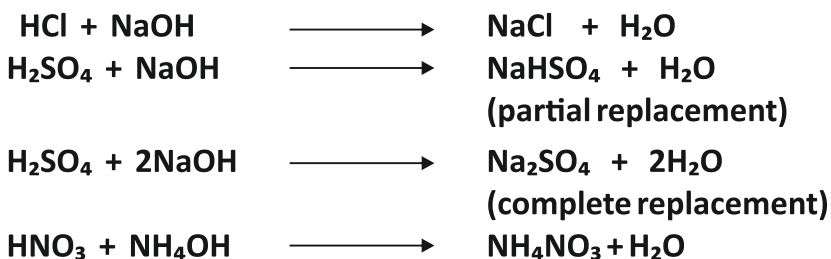
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## Salt

Riya and Kabir are playing with salt crystals.



Salt is a compound formed by the partial or complete replacement of the hydrogen of an acid by a metal or an electropositive radical.



Look carefully at the formulas of salts in the above reactions.

- Sodium hydrogen sulphate ( $\text{NaHSO}_4$ ) is formed by partial replacement of hydrogen atom (H) of sulphuric acid ( $\text{H}_2\text{SO}_4$ ) by sodium atom.

- Sodium sulphate ( $\text{Na}_2\text{SO}_4$ ) is formed by the complete replacement of both the hydrogen atoms of sulphuric acid by two atoms of sodium.
- Sodium chloride ( $\text{NaCl}$ ) is formed by replacing hydrogen atom (H) from a molecule of hydrochloric acid ( $\text{HCl}$ ) by sodium atom.
- Ammonium nitrate is formed by replacing the hydrogen atom of nitric acid ( $\text{HNO}_3$ ) by an ammonium group.

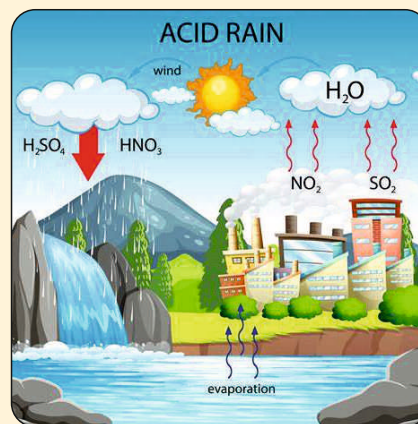
### Properties of Salts

- Salts are mostly solids with high melting points and high boiling points.
- Salts are usually soluble in water.
- Solution of salts in water conducts electricity.

Name of salt	Chemical formula	Parent acid	Uses
Sodium chloride (common salt or table salt)	$\text{NaCl}$	Hydrochloric acid ( $\text{HCl}$ )	Used as essential food material
Sodium carbonate (washing soda)	$\text{Na}_2\text{CO}_3$	Carbonic acid ( $\text{H}_2\text{CO}_3$ )	In cleaning, water softening
Calcium carbonate (marble, lime, chalk)	$\text{CaCO}_3$	Carbonic acid	As marble
Copper sulphate (blue vitriol)	$\text{CuSO}_4$	Sulphuric acid	As fungicides
Ammonium sulphate	$(\text{NH}_4)_2\text{SO}_4$	Sulphuric acid	Fertilizers
Ammonium nitrate	$(\text{NH}_4).\text{2NO}_3$	Nitric acid	Fertilizers, explosives
Calcium phosphate	$\text{Ca}_3(\text{PO}_4)_2$	Phosphoric acid	Making fertilizers

### Acid Rain

The rain containing excess of acids is called acid rain. The rain becomes acidic because carbon dioxide, sulphur dioxide and nitrogen dioxide (which are released into the air as pollutants) dissolve in raindrops to form carbonic acid, sulphuric acid and nitric acid respectively. Acid rain can cause damage to buildings, historical monuments, plants and animals.



## SUMMARY



Acids, bases, and salts are essential components in both nature and our daily lives. They play critical roles in our bodies, household activities, industry, and the environment. Understanding their properties, how they interact, and their uses allows us to appreciate the science that surrounds us.

### Acids and its Classification

Acids are substances that have a sour taste and can change the color of certain plant extracts. They are classified as organic or mineral acids based on their source. Organic acids are found in fruits and plants, like citric acid in lemons. Mineral acids are usually stronger and are synthesized in laboratories, like hydrochloric acid.

The key characteristics of acids are their sour taste, ability to turn blue litmus paper red, and reactivity with metals to produce hydrogen gas. Acids are used in many areas, from food preparation (e.g., vinegar) to industrial applications (e.g., sulfuric acid in car batteries).

### Bases and its Classification

Bases are substances that can neutralize acids and often have a bitter taste and a slippery feel. Bases are found in many cleaning products like soaps and detergents. They can be classified as strong or weak bases depending on their ability to dissociate in water.

Strong bases like sodium hydroxide are very reactive and must be handled with care, while weak bases like baking soda are commonly used in household activities, such as baking. Bases turn red litmus paper blue and react with oils and fats, which makes them useful for cleaning.

### Neutralization in Everyday Life

Neutralization is a chemical reaction between an acid and a base, resulting in the formation of salt and water. This process is not only important in chemistry labs but also plays a vital role in our daily lives.

For instance, when you have an upset stomach due to excess acid, an antacid (a mild base) can be taken to neutralize the acid and provide relief. Similarly, in agriculture, neutralization helps reduce the acidity of soil by adding bases, ensuring a healthier crop yield. In cooking, adding vinegar to baking soda creates carbon dioxide, which helps cakes rise and become fluffy.

### Salts

Salts are compounds formed when acids and bases neutralize each other. Common salt (sodium chloride) is the most well-known example, but there are many other types of salts with various uses. For example, calcium carbonate is used in construction, and Epsom salt is used for health and relaxation.

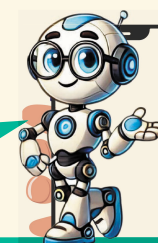
Salts are found naturally in seawater and in mineral deposits on land. They are vital for human health, playing a role in maintaining fluid balance in the body.

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# EXERCISE

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## A. Choose the correct answer.

- Which of the following turns blue litmus paper red?  
(a) Water ☐ (b) Acid ☐  
(c) Base ☐ (d) Salt ☐
- Which of the following substances can neutralize an acid?  
(a) Lemon juice ☐ (b) Vinegar ☐  
(c) Baking soda ☐ (d) Sugar ☐
- Which of the following is a natural acid?  
(a) Hydrochloric acid ☐ (b) Sulfuric acid ☐  
(c) Citric acid ☐ (d) Sodium hydroxide ☐
- What happens when an acid reacts with a base?  
(a) They form water only ☐ (b) They produce salt and water ☐  
(c) They form gas ☐ (d) They become stronger ☐
- What kind of taste do bases usually have?  
(a) Sour ☐ (b) Sweet ☐  
(c) Bitter ☐ (d) Salty ☐

## B. Fill in the blanks.

- Bases have a \_\_\_\_\_ taste and feel \_\_\_\_\_ to touch.
- The process of mixing an acid and a base to form a neutral product is called \_\_\_\_\_.
- A substance that turns blue litmus paper red is called an \_\_\_\_\_.
- Baking soda is an example of a \_\_\_\_\_ base.
- Salt is produced when an \_\_\_\_\_ reacts with a \_\_\_\_\_.

## C. Write True or False.

- Acids taste bitter. \_\_\_\_\_
- Neutralization results in the formation of salt and water. \_\_\_\_\_
- Bases turn red litmus paper blue. \_\_\_\_\_
- Acids can react with metals to release hydrogen gas. \_\_\_\_\_
- Baking soda is acidic in nature. \_\_\_\_\_

### D. Define the following terms.

- |         |              |                   |
|---------|--------------|-------------------|
| 1. Acid | 2. Base      | 3. Neutralization |
| 4. Salt | 5. Indicator |                   |

### E. Match the columns.

#### Column A

1. Acid
2. Base
3. Neutralization
4. Salt
5. Indicator

#### Column B

- (a) Turns red litmus paper blue
- (b) Turns blue litmus paper red
- (c) Produces salt and water
- (d) Formed after acid-base reaction
- (e) Helps identify acids or bases

### F. Give reasons for the following statements.

1. Acids should be handled with care.
2. Baking soda can neutralize an acid.
3. Litmus is used as an indicator.
4. Plants do not grow well in highly acidic soil.
5. Neutralization is important for indigestion treatment.

### G. Answer in brief.

1. What is an acid?
2. How do bases feel when touched?
3. What happens in a neutralization reaction?
4. Why are natural indicators like turmeric used in experiments?
5. What are some uses of salts in daily life?

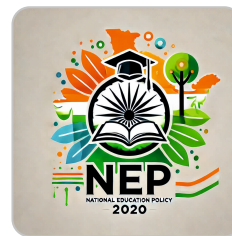
### H. Answer in detail.

1. Explain the properties of acids with examples from everyday life.
2. Describe the process of neutralization and its importance.
3. What are bases, and where are they commonly found in homes?
4. How are salts formed, and what are their uses?
5. Compare acids and bases based on their properties and uses.

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### Blended Learning Models

Schools and institutions are encouraged to adopt hybrid teaching models, combining traditional methods with online education for better engagement.

## Skill-based Activity



### Curious Minds at Work

**STEM**

Observe the use of an acid or base in your home. Write a question about how it works and use the scientific method to describe the steps to answer your question.

**Skills Covered:** Critical and logical thinking, Brainstorming, Analytical thinking, Problem-solving, Curiosity

### Wonders of Acids and Bases

**Art**

Create a detailed sketch showing a neutralization reaction between an acid and a base. Write a description explaining the reaction and its uses in daily life. Present your work to the class.

**Skills Covered:** Creativity, Critical and logical thinking, Applicative thinking

### Acids, Bases, and Salts in Action

**Group Activity**

In groups, create a chart comparing acids, bases, and salts. Present your findings, highlighting similarities and differences between them.

**Skills Covered:** Critical and logical thinking, Brainstorming, Teamwork, Communication, Applicative thinking

### Technology in Focus

**Case to Investigate**

Research how acids, bases, and salts are used in industry, such as in soap making or food preservation. Write a short report on how these processes benefit society.

**Skills Covered:** Critical and logical thinking, Brainstorming, Research, Applicative thinking

### Sustainable Chemistry

**Aligning with SDGs**

Research a program or initiative that focuses on sustainable use of acids, bases, or salts (e.g., reducing soil acidity). Highlight its key features and how it aligns with sustainable development goals. Present your findings to the class.

**Aligned with:** SDG 12 – Responsible Consumption and Production

**Skills Covered:** Critical and logical thinking, Brainstorming, Research, Problem-solving, Ethics

### Mapping Chemistry

**Integrated Learning**

Create a map of household substances that contain acids, bases, or salts.

**Integrated Learning:** Chemistry

**Skills Covered:** Critical and logical thinking, Brainstorming, Analytical thinking, Applicative thinking