

**Vision Empower & XRCVC**  
Teacher Instruction KIT  
**Acids, Bases and Salts**

Syllabus: NCERT

Subject: Science

Grade: 7

Textbook Name: NCERT- Science Textbook for class VII

Chapter Number & Name: 5. Acids, Bases and Salts

## **1. OVERVIEW**

### **1.1 OBJECTIVES AND PREREQUISITES**

#### **Objective**

- To understand acids and bases.
- To understand the different types of indicators used.
- Understanding neutralization reactions and neutralization in everyday life.

#### **Prerequisite Concept**

- Solubility

*Grade 6, chapter 4 Sorting materials into groups*

#### **Content Index**

*Kindly Note: Activities marked with \* are mandatory*

#### **1. OVERVIEW**

##### **1.1 OBJECTIVES AND PREREQUISITES**

#### **2. LEARN**

##### **2.1 KEY POINTS**

##### **2.2 LEARN MORE**

#### **3. ENGAGE**

##### **3.1 INTEREST GENERATION ACTIVITY**

Interest generation activity

Activity 1: Substances and their tastes

##### **3.2 CONCEPT INTRODUCTION ACTIVITIES**

Physical property of acid and bases

Activity 2: Physical property of acid and bases

Olfactory indicators

Activity 3: Understanding the use of olfactory indicators

Indicators

Activity 4: Litmus paper as an Indicator

Activity 5: Turmeric as Indicator

Activity 6: China rose as Indicator

Neutralization

Activity 7: Neutralization

3.3 LET'S DISCUSS: RELATE TO DAILY LIFE\*

#### **4. EXERCISES & REINFORCEMENT**

4.1 EXERCISES & REINFORCEMENT

Reinforcement

Activity 8: Examples of acid and bases

4.2 IMPORTANT GUIDELINES\*

Exercise Reading

Perform Textbook Activity

Provide Homework

## **2. LEARN**

### **2.1 KEY POINTS**

The word acid comes from the Latin word *acere* which means sour. Substances such as lemon juice, vinegar taste sour because they contain acids.

Substances which are bitter in taste and feel soapy on touching are known as bases. The nature of such substances is said to be basic.

Substances used to test whether a substance is acidic or basic are known as indicators. The indicators change their colour when added to a solution containing an acidic or a basic substance. Turmeric, litmus, China rose petals (Gudhal), etc., are some of the naturally occurring indicators.

The most commonly used natural indicators are litmus paper, turmeric and china rose. Litmus is extracted from lichens. When added to an acidic solution, it turns red and when added to a basic solution, it turns blue. It is available in the form of a solution, or in the form of strips (litmus paper).

Turmeric is yellow in colour and turns reddish brown when added to a basic solution and remains the same in an acidic solution.

Rose Petals turns acidic solutions to dark pink and turns basic solutions to green.

### **2.2 LEARN MORE**

None

## **3. ENGAGE**

### 3.1 INTEREST GENERATION ACTIVITY

#### **Interest generation activity**

##### **Activity 1: Substances and their tastes**

*Materials Required: None*

*Prerequisites: None*

##### *Activity Flow*

- Ask the students if they have tasted any of these substances: lemon, orange, curd, salt, amla.
- If they have not, then the teacher can ask them to taste it and tell how they taste.
- Some of these substances taste sour, some taste bitter, some taste sweet and some taste salty.
- Ask the students if they know what gives citrus fruits such as lemons, oranges, etc. the sour taste.

### 3.2 CONCEPT INTRODUCTION ACTIVITIES

#### **Physical property of acid and bases**

##### **Activity 2: Physical property of acid and bases**

*Materials Required: Lime juice, bitter gourd juice*

*Prerequisites: None*

##### *Activity Flow*

- Give the student a glass of lime juice (acid) and a glass of bitter gourd juice (base).
- Ask the student how they can taste.
- Then the teacher can explain the difference in taste between an acid and base.
- Inference: Lime juice is acidic in nature and is hence sour to taste. Bitter gourd juice is basic in nature and is hence bitter to taste. Bases are substances which are bitter in taste and slippery when felt. Some of the bases in our daily lives are baking soda, soap.
- Note: Bases are bitter but not every bitter substance is a base.
- NOTE: The facilitator is to explain the concept of indicators orally before performing the following activities. The facilitator is to download the Titration colour cam app for colour identification in indicator tests.

#### **Olfactory indicators**

### **Activity 3: Understanding the use of olfactory indicators**

*Materials Required:* Lime juice, bitter gourd juice, chopped onions, plastic bag, fresh cloth strips, and refrigerator

*Prerequisites:* None

*Activity Flow:*

- The facilitator will put chopped onions and fresh cloth pieces in a closed plastic bag and will leave it overnight in the refrigerator.
- Facilitator will assist the student to add a drop of lime juice and bitter gourd juice to two cloth pieces respectively.
- Facilitator will ask the child to note the difference in smell in both the strips.
- Facilitator to explain that the cloth piece with bitter gourd juice loses its characteristic onion smell, whereas the piece with lime juice retains the smell.
- Facilitator to explain the use of olfactory receptors.

### **Indicators**

#### **Activity 4: Litmus paper as an Indicator**

*Materials required:* red and blue litmus paper, lemon juice, baking soda solution, salt water solution

*Prerequisites:* None

*Activity Flow*

- Tell the students that it is not safe to taste every substance. So how do we determine whether a substance is acidic or basic in nature?
- There are different indicators which are used to determine the nature of these substances.
- Teacher should put a few drops of each of the solutions on red litmus paper.
- The student should then be directed to use the Titration colour cam app to point it towards the strip of litmus paper and observe the colours for each of the solutions.
- Record these observations.
- Repeat the same exercise with a blue litmus paper.
- Inference:

For lemon juice (acid)

Red litmus paper → remains red

Blue litmus paper → becomes red

For Baking soda solution (base)

Red litmus paper → becomes blue

Blue litmus paper → remains blue

For Salt water solution (neutral)

Red litmus paper → no change

Blue litmus paper → no change

### **Activity 5: Turmeric as Indicator**

*Materials Required:* turmeric powder, water, blotting paper/filter paper, soap solution,

*Prerequisites:* None

#### *Activity Flow*

- Take a tablespoonful of turmeric powder. Add a little water and make a paste.
- Make turmeric paper by depositing turmeric paste on blotting paper/filter paper and drying it. Cut thin strips of the yellow paper obtained. While doing this either teacher or a sighted peer should help.
- Put a drop of soap solution on the strip of turmeric paper and then explain to the children that turmeric is yellow in colour and turns reddish brown when added to a basic solution and remains the same in an acidic solution.
- After that children can try different solutions for different indicators such as Vinegar, baking soda, common salt, sugar, and orange juice.

### **Activity 6: China rose as Indicator**

*Materials Required:* china rose, warm water, lemon juice, baking soda, 3 containers

*Prerequisites:* None

#### *Activity Flow*

- Add petals of China rose (Gudhal) to a container with warm water and keep the mixture for some time till the water becomes coloured.
- Add five drops of this solution to the container with lemon juice and baking soda respectively.
- Observe the colour in the 2 containers through the Titration colour cam app or the teacher can help in explaining the observation.
- Inference: China rose indicator turns acidic solutions to dark pink (magenta) and basic solution to green. Therefore, the container with lemon juice turns dark pink and the container with baking soda solution turns green.

## **Neutralization**

### **Activity 7: Neutralization**

*Materials Required:* dilute hydrochloric acid, test tubes, sodium hydroxide, phenolphthalein solution (as an indicator)

*Prerequisites:* None

*Activity Flow*

- Fill one fourth of a test tube with dilute hydrochloric acid. Note down its colour and also the colour of phenolphthalein solution by using titration colour cam or ask from a sighted peer.
- Add 2–3 drops of the indicator to the acid. Now shake the test tube gently. You would observe no change in colour of the acid.
- Add to the acidic solution a drop of sodium hydroxide solution by a dropper.
- Stir the tube gently. Is there any change in the colour of the solution? Continue adding the sodium hydroxide solution drop by drop while stirring till the pink colour just appears.
- Now add one more drop of dilute hydrochloric acid. What do you observe? The solution again becomes colourless. Again add one drop of sodium hydroxide solution. Is there any change in colour? The solution again becomes pink in colour.
- It is evident that when the solution is basic, phenolphthalein gives a pink colour. On the other hand, when the solution is acidic, it remains colourless.
- When an acidic solution is mixed with a basic solution, both the solutions neutralise the effect of each other.
- Further, explain to them about neutralization reaction.
- The reaction between an acid and a base is known as neutralization. Salt and water are produced in this process with the evolution of heat.

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

- The following reaction is an example:

Hydrochloric acid (HCl) + Sodium hydroxide (NaOH) → Sodium chloride (NaCl) + Water (H<sub>2</sub>O)

*NOTE:* When discussing the indicators, describe the process completely, making sure the student does not get confused regarding which colour indicates an acid and which denotes a base. When performing experiments, describe the colour of the litmus paper/ turmeric paper or paste. When using the Chinese rose, as far as possible, allow the student to handle the flower.

*Describe the process of neutralization in detail and allow the student to handle some safe salts.*

*When performing experiments in the lab, make sure the student has a sighted assistant who describes in detail the colour changes of indicators, as the colour change is happening.*

### 3.3 LET'S DISCUSS: RELATE TO DAILY LIFE\*

(From the textbook)

1. Indigestion: stomach contains hydrochloric acid and it helps to digest food. But too much acid in the stomach causes indigestion. Sometimes indigestion is painful. To relieve indigestion, antacid such as milk of magnesia, which contains magnesium hydroxide, is taken. It neutralizes the effect of excessive acid.
2. Ant bite: When an ant bites, it injects the acidic liquid (formic acid) into the skin. The effect of the acid can be neutralized by rubbing moist baking soda (sodium hydrogen carbonate) or calamine solution, which contains zinc carbonate.
3. 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 quicklime (calcium oxide) or slaked lime (calcium hydroxide). If the soil is basic, organic matter (compost) is added to it. Organic matter releases acids which neutralizes the basic nature of the soil.
4. Factory wastes: the wastes of many factories contain acids. If they are allowed to flow into the water bodies, the acids will kill fish and other organisms. The factory wastes are, therefore, neutralized by adding basic substances.

## 4. EXERCISES & REINFORCEMENT

### 4.1 EXERCISES & REINFORCEMENT

#### Reinforcement

#### Activity 8: Examples of acid and bases

*Materials Required: None*

*Prerequisites: nature of acid and bases*

#### Activity Flow

- Give the students some examples of acids bases and salts and ask the student if they can think of some more examples, either from everyday life or in the chemistry lab.

### 4.2 IMPORTANT GUIDELINES\*

#### Exercise Reading

It is very important that the children practice their learnings as well as their reading. Hence have the children read out the newly learned concepts from their textbooks or other available resources.

### **Perform Textbook Activity**

It is good practice to have the children perform the textbook activities. Your textbook activities might not be accessible hence go through this resource to learn how to make textbook content accessible

### **Provide Homework**

To evaluate their understanding and to help the student revise and implement the new learnt concept ensure to provide them with homework. Students should perform one or two of the questions mentioned above or from the textbook exercises with the teacher in Class and the remaining may be given for homework. Also, ensure that the student knows their special skills linked to independently using their accessible books as it will be critical to doing homework independently

*End of Document*