

**AS PER LATEST
CBSE CURRICULUM**

**SCIENCE
LAB MANUAL**

Class : X



LAB MANUAL MATHS X

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 - d) Lemon Juice
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 - c) Solid sodium carbonate
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 - c) Displacement reaction
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 - ii. Action of heat on blue copper sulphate crystals
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 - iv. Reaction between sodium sulphate and barium chloride solutions
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 - b) $\text{FeSO}_{4(\text{aq})}$
 - c) $\text{CuSO}_{4(\text{aq})}$
 - d) $\text{Al}_2(\text{SO}_4)_3(\text{aq})$
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-
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EXPERIMENT - 1

AIM

- A. To study the pH of the following samples using pH paper/Universal indicator.
- Dilute hydrochloric acid.
 - Dilute sodium hydroxide solution.
 - Dilute ethanoic acid solution.
 - Lemon juice.
 - Water.
 - Dilute hydrogen carbonate solution.
- B. Studying the properties of acids and bases (HCl & NaOH) and their reaction with:
- Litmus solution (Blue /Red)
 - Zinc metal
 - Solid sodium bicarbonate

MATERIAL REQUIRED

- Dilute hydrochloric acid
- Dilute sodium hydroxide solution.
- Dilute ethanoic acid solution.
- Lemon juice
- Water
- Dilute sodium bicarbonate solution
- Wide range pH papers
- Standard colour chart to compare pH value
- Fine dropper, glazed tiles.

THEORY

pH is defined as the negative logarithm of the hydrogen ion concentration in moles per liter.

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

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

Neutral solution has pH value 7. Acidic solution has a pH value less than 7. While the pH value more than 7 is considered as basic solution. It is obvious from the below scale.

Acidic solution	Neutral solution	Basic solution
0 1 2 3 4 5 6	7	8 9 10 11 12 13 14
Acidic nature increases ←		Basic nature increase →

When the pH paper dipped in the solution whose pH is to be found out, a colour is developed on the pH paper. The colour is matched with the standard colour chart.

In the place of pH paper we can use the universal indicator the different colour may appear as follows. On the basis of different colour we can determine the pH value.

PROCEDURE

Take 6 clean test tubes. Label them A, B, C, D, E and F. Take 3 or 4 ml of the sample solutions in each of them. Dil. HCl in A, Dil. NaOH in B, Dil. CH_3COOH in C, Dil Lemon Juice in D, Clean water in E and Dil. Sodium bicarbonate solution in F. The test tubes with the solutions are kept on a stand. Take a clean white tile and place it in front of the solutions. Six clean glass rods are taken and they are put in each of the test tubes. Place a strip of pH paper on the tile and a drop of dil. HCl is put on the "test strip" with the glass rod.

Observe the colour change of pH paper and record it in observation table.

The same procedure may be followed for all the sample solutions.

Every time use a fresh pH paper. Use a forceps to take out pH paper.

OBSERVATION AND INFERENCE

Compare the colour of pH paper with that of the pH chart and find out the value.

Sl.No	Sample solution	Colour produced on pH paper	Approximate pH	Inference
1.	Dil HCl			
2.	Dil NaOH			
3.	Dil CH_3COOH			
4.	Lemon Juice			
5.	Water			
6.	Dil NaHCO_3			

PRECAUTIONS

- Keep the pH strips away from chemical fumes.
- Always use fresh dropper.
- Use only standard colour chart supplied with the pH paper.
- Use distilled water for preparing solution of the substances.
- Mark the test tube carefully.
- Use the dilute solution of juices.

VIVA VOCE

1. The pH solutions A, B and C are 3, 7 and 13 respectively. Which solution is (1) acidic (ii) neutral (iii) basic?
2. Why was the concept of pH of solution widely accepted in relation to the concentration of H^+ (aq) ions per liter of the solution?
3. What is pH scale?
4. What do you understand by the term pH of a solution?
5. What is a pH paper?
6. Name the scientist who introduced the concept of pH of a solution.
7. What is universal indicator?
8. What is the concentration of H^+ (aq) ions in distilled water?