Introduction Tastes

Daily Substances and Their Tastes

We encounter many substances daily such as lemon, tamarind, common salt, sugar, and vinegar. These substances have different tastes like sour, bitter, sweet, and salty. Taste is detected by taste buds on the tongue, which recognize five primary tastes: sweet, sour, salty, bitter, and umami.

Scientific Basis of Taste

Sour taste is due to acids like citric acid in lemon juice or acetic acid in vinegar. Bitter taste arises from compounds such as alkaloids. Sweet taste comes from sugars like glucose and fructose. Salty taste is due to salts like sodium chloride.

Acids Bases

Nature of Acids and Bases

Substances like curd, lemon juice, orange juice, and vinegar taste sour because they contain acids. Acids have an acidic nature. The word acid comes from Latin 'acere' meaning sour. Bases, on the other hand, are substances that taste bitter and feel soapy, such as baking soda. Bases have a basic nature.

Indicators

Indicators are special substances used to test whether a substance is acidic or basic. They change color in the presence of acids or bases. Natural indicators include turmeric, litmus, and China rose petals.

Common Acids and Bases

Acids include acetic acid (vinegar), formic acid (ant sting), citric acid (citrus fruits), lactic acid (curd), oxalic acid (spinach), ascorbic acid (Vitamin C in amla), and tartaric acid (tamarind, grapes). Bases include calcium hydroxide (lime water), ammonium hydroxide (window cleaner), sodium hydroxide and potassium hydroxide (soap), and magnesium hydroxide (milk of magnesia).

Natural Indicators

Litmus Indicator

Litmus is a natural dye extracted from lichens. It is purple in distilled water. In acidic solutions, it turns red; in basic solutions, it turns blue. It is available as red and blue litmus paper.

Turmeric Indicator

Turmeric powder mixed with water forms a paste that can be used as an indicator. Turmeric solution is yellow and turns red or reddish-brown in the presence of bases. It does not change color in acids.

China Rose Indicator

China rose petals can be soaked in warm water to produce a natural indicator solution. This indicator turns acidic solutions orange or dark pink, neutral solutions pink, and basic solutions green.

Neutralisation

Reaction Between Acids and Bases

When an acid is mixed with a base, they neutralize each other's effects. The reaction produces salt and water with the evolution of heat. This process is called neutralisation.

Phenolphthalein Indicator

Phenolphthalein is an indicator that is colorless in acidic solutions and turns pink in basic solutions. It helps observe the neutralisation process.

Example Reaction

Hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH) to form sodium chloride (NaCl) and water (H_2O):

Acid + Base → Salt + Water + Heat

Neutralisation Everyday Life

Indigestion

Excess stomach acid causes indigestion. Antacids like milk of magnesia neutralize this excess acid.

Ant Bite

Ant bites inject formic acid. Applying baking soda or calamine solution neutralizes the acid effect.

Soil Treatment

Acidic soil is treated with bases like quick lime or slaked lime. Basic soil is treated with organic matter that releases acids.

Factory Wastes

Factory wastes containing acids are neutralized with bases before being released into water bodies to protect aquatic life.

Solved Examples

Example 1: Identify whether lemon juice is acidic or basic using litmus paper.

Solution: When lemon juice is tested with blue litmus paper, it turns red, indicating it is acidic.

Example 2: What happens when hydrochloric acid is mixed with sodium hydroxide?

Solution: Hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH) to form sodium chloride (NaCl) and water (H_2O), releasing heat. This is a neutralisation reaction.

Practice Set

- **Level 1:** What color does red litmus paper turn when dipped in a basic solution?
- **Level 2:** Explain why turmeric solution changes color in the presence of a base but not in an acid.
- **Level 3:** A solution turns blue litmus paper red and does not change the color of turmeric solution. Identify the nature of the solution and justify your answer.

Answer Key

- **Level 1:** Red litmus paper turns blue in a basic solution.
- **Level 2:** Turmeric contains curcumin, which changes color in alkaline (basic) conditions turning from yellow to red, but remains yellow in acidic conditions.
- **Level 3:** The solution is acidic because it turns blue litmus paper red and does not change turmeric solution color, which remains yellow in acids.

Quick Reference Table

- **Acids:** Sour taste, turn blue litmus red, examples: lemon juice (citric acid), vinegar (acetic acid), curd (lactic acid).
- **Bases:** Bitter taste, soapy feel, turn red litmus blue, examples: baking soda (sodium bicarbonate), lime water (calcium hydroxide), soap (sodium hydroxide).
- **Indicators:** Litmus (red in acid, blue in base), turmeric (yellow in acid, red in base), China rose (pink in neutral, orange in acid, green in base).
- **Neutralisation:** Acid + Base → Salt + Water + Heat.

Common Mistakes and Misconceptions

- Assuming all sour substances are acids without testing.
- Using solid baking soda directly on litmus paper instead of its solution.
- Confusing the color changes of indicators; for example, red litmus turns blue in base, not acid.
- Believing that neutral substances affect indicators; neutral solutions do not change litmus paper color.

Glossary

- **Acid:** Substance with sour taste that turns blue litmus red.
- **Base:** Substance with bitter taste and soapy feel that turns red litmus blue.
- **Indicator:** Substance that changes color in acidic or basic solutions.

- **Neutralisation:** Reaction between acid and base producing salt and water.
- **Salt:** Compound formed from the neutralisation of an acid and a base.
- **Litmus Paper:** Paper used to test acidity or basicity of a solution.
- **Phenolphthalein:** Indicator that is colorless in acid and pink in base.