Acids, Bases, Salts

Saitechinfo Centum Cyclic Unit Test
Topic: Acids, Bases, and Salts
Class: STD 10, Science
Duration: 90 Minutes
Marks: 45 max

Section A: Objective Type Questions (20 x 1 mark = 20 marks)

1. A solution turns red litmus blue. Its pH is likely to be:

    - (a) 1
    - (b) 4
    - (c) 5
    - (d) 10

2. A solution reacts with crushed eggshells to give a gas that turns lime-water milky. The solution contains:

    - (a) NaCl
    - (b) HCl
    - (c) LiCl
    - (d) KCl

3. 10 mL of a solution of NaOH is found to be completely neutralized by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount of HCl solution required to neutralize it will be:

    - (a) 4 mL
    - (b) 8 mL
    - (c) 12 mL
    - (d) 16 mL

4. Which one of the following types of medicines is used for treating indigestion?

    - (a) Antibiotic
    - (b) Analgesic
    - (c) Antacid
    - (d) Antiseptic

5. Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd?

    - (a) Increase
    - (b) Decrease

- (c) Remain the same
- (d) Become neutral

6. Plaster of Paris should be stored in a moisture-proof container. This is because it:

   - (a) Hardens in the presence of moisture
   - (b) Reacts with CO_2
   - (c) Decomposes
   - (d) Loses its plasticity

7. When hydrochloric acid reacts with magnesium ribbon, the gas evolved is:

   - (a) Chlorine
   - (b) Oxygen
   - (c) Hydrogen
   - (d) Nitrogen

8. The reaction between an acid and a base to give a salt and water is called:

   - (a) Neutralization
   - (b) Saponification
   - (c) Esterification
   - (d) Fermentation

9. Which of the following acids is present in vinegar?

   - (a) Acetic acid
   - (b) Citric acid
   - (c) Tartaric acid
   - (d) Lactic acid

10. The pH of a neutral solution is:

    - (a) 0
    - (b) 7
    - (c) 14
    - (d) 1

11. When carbon dioxide is passed through lime water, it turns milky due to the formation of:

    - (a) Calcium carbonate
    - (b) Calcium hydroxide
    - (c) Calcium oxide
    - (d) Calcium bicarbonate

12. The chemical formula for washing soda is:

    - (a) $NaHCO_3$
    - (b) $Na_2CO_3 \cdot 10H_2O$
    - (c) Na_2CO_3
    - (d) NaCl

13. Which of the following is a strong acid?

- (a) Acetic acid
- (b) Citric acid
- (c) Sulphuric acid
- (d) Formic acid

14. When an acid reacts with a metal carbonate, the products are:

- (a) Salt and water
- (b) Salt, water, and carbon dioxide
- (c) Salt and carbon dioxide
- (d) Salt and hydrogen

15. The process of dissolving an acid or a base in water is called:

- (a) Dilution
- (b) Neutralization
- (c) Crystallization
- (d) Saturation

16. Which of the following is a weak acid?

- (a) Hydrochloric acid
- (b) Sulphuric acid
- (c) Acetic acid
- (d) Nitric acid

17. Sodium hydroxide solution turns phenolphthalein:

- (a) Red
- (b) Blue
- (c) Green
- (d) Pink

18. Which gas is usually liberated when an acid reacts with a metal?

- (a) Oxygen
- (b) Nitrogen
- (c) Hydrogen
- (d) Chlorine

19. The substance used for whitewashing is:

- (a) Slaked lime
- (b) Washing soda
- (c) Baking soda
- (d) Lime water

20. What is the common name of the compound $CaOCl_2$?

- (a) Baking soda
- (b) Bleaching powder
- (c) Washing soda
- (d) Plaster of Paris

Section B: Descriptive Type Questions (5 x 3 marks = 15 marks)

1. Explain why an aqueous solution of an acid conducts electricity.
2. What happens when an acid reacts with a metal? Write a balanced chemical equation for the reaction between hydrochloric acid and zinc.
3. How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted?
4. Describe an activity to prove that compounds such as alcohol and glucose are not acids.
5. Why do acids not show acidic behavior in the absence of water?

Section C: Problems (2 x 5 marks = 10 marks)

1. A solution of sodium hydroxide (NaOH) is titrated with hydrochloric acid (HCl). If 25 mL of 0.1 M NaOH completely neutralizes 20 mL of HCl, what is the molarity of the HCl solution?
2. Write the chemical equation for the reaction of sodium carbonate with hydrochloric acid. Calculate the mass of sodium chloride formed when 53 g of sodium carbonate reacts with excess hydrochloric acid.

Answer Key

Section A:

1. (d) 10
2. (b) HCl
3. (d) 16 mL
4. (c) Antacid
5. (b) Decrease
6. (a) Hardens in the presence of moisture
7. (c) Hydrogen
8. (a) Neutralization
9. (a) Acetic acid
10. (b) 7
11. (a) Calcium carbonate
12. (b) $Na_2CO_3 \cdot 10H_2O$
13. (c) Sulphuric acid
14. (b) Salt, water, and carbon dioxide
15. (a) Dilution
16. (c) Acetic acid
17. (d) Pink
18. (c) Hydrogen
19. (a) Slaked lime
20. (b) Bleaching powder

Section B:

1. Acids dissociate in water to produce ions, which can carry an electric current.

2. When an acid reacts with a metal, hydrogen gas is evolved and a salt is formed.
    - Example: $\mathrm{Zn} + 2\mathrm{HCl} \rightarrow \mathrm{ZnCl_2} + \mathrm{H_2}$
3. Diluting an acid decreases the concentration of hydronium ions (H_3O^+), thus reducing the acidity.
4. Add alcohol and glucose to water, they do not change the color of indicators, showing they do not dissociate to form H^+ ions.
5. Acids produce H^+ ions only in the presence of water, which are responsible for their acidic properties.

Section C:

1. $M_1V_1 = M_2V_2$
    - $0.1 \times 25 = M_2 \times 20$
    - $M_2 = \frac{0.1 \times 25}{20} = 0.125\ \mathrm{M}$
2. $\mathrm{Na_2CO_3} + 2\mathrm{HCl} \rightarrow 2\mathrm{NaCl} + \mathrm{H_2O} + \mathrm{CO_2}$
    - Molar mass of $\mathrm{Na_2CO_3}$ = 106 g/mol
    - Moles of $\mathrm{Na_2CO_3}$ = $\frac{53}{106} = 0.5\ \mathrm{mol}$
    - Moles of NaCl = 2 × 0.5 = 1 mol
    - Mass of NaCl = 1 × 58.5 = 58.5 g