Neutralisation: Concept and Applications

A. Fill in the Blanks

Complete the sentences with the correct scientific term.

1. The reaction between an acid and a base is known as a _____ reaction.
2. A solution that is neither acidic nor basic is called _____.
3. _____ is an indicator that is colourless in acid and pink in a base.
4. Antacids contain a _____ to neutralise excess stomach acid.
5. When an acid reacts with a base, the products are always a salt and _____.

B. Match the Following;

Match the example in Column A with the best description in Column B. Write the letter of your answer in the blank.

Column A	Column B
1. Hydrochloric Acid	A. A product of neutralisation (e.g., table salt)
2. Sodium Hydroxide	B. The process of treating a bee sting with baking soda
3. Salt	C. A strong acid found in the stomach
4. Neutralisation	D. An indicator used to test for acids and bases
5. Litmus Paper	E. A strong base used in making soap

C. Practice Problems

Apply your knowledge to complete these problems.

1. Complete the following word equation: Hydrochloric Acid + Sodium Hydroxide → _____+ Water
2. Complete the following word equation: Sulphuric Acid + Potassium Hydroxide → Potassium Sulphate + _____
3. Identify the acid, base, and salt in the following reaction: Nitric Acid + Calcium Hydroxide → Calcium Nitrate + Water

- Acid: _____
- Base: _____
- Salt: _____

4. What colour change would you observe if you dipped blue litmus paper into a beaker of lemon juice (an acid)?
5. What colour change would you observe if you added a few drops of phenolphthalein indicator to a solution of soap (a base)?
6. A solution is formed by mixing an acid and a base. After the reaction, the solution has no effect on either red or blue litmus paper. What can you conclude about the solution?
7. What salt is formed when Acetic Acid (found in vinegar) reacts with Sodium Hydroxide?
8. Complete the word equation: Phosphoric Acid + Sodium Hydroxide → _____ + Water
9. If a solution turns red litmus paper blue, is it an acid or a base?
10. Why is the product of a neutralisation reaction called a "salt" and not just "table salt"?

D. Warm-up Questions

Answer these quick questions to refresh your memory.

1. What is the taste of most acids?
2. What is the feel of most basic solutions?
3. What is the general name for the reaction between an acid and a base?
4. What are the two main products formed during a neutralisation reaction? _____ and _____.
5. What does an indicator, like litmus paper, help us determine?

E. Challenge Questions

Think critically to solve these problems.

1. A student has a beaker of a clear, unknown solution. When they add a drop of phenolphthalein, the solution turns bright pink. What kind of substance should they add to the beaker to make the pink colour disappear? Explain your reasoning.
2. You are given three unlabelled beakers containing an acidic solution, a basic solution, and pure distilled water. You only have a strip of red litmus paper. How can you identify all three liquids?
3. A student mixes 20 mL of a strong acid with 25 mL of a strong base of the same strength. Will the final mixture be acidic, basic, or neutral? Why?

4. Write the full word equation for the neutralisation reaction that occurs inside your stomach when you take an antacid containing Magnesium Hydroxide to relieve indigestion caused by excess Hydrochloric Acid.

5. Can a salt solution be acidic or basic? Briefly explain why or why not.

F. Word Problems & Application

Connect neutralisation to real-world scenarios.

1. Indigestion: Riya is suffering from indigestion due to overeating, which causes excess acid in her stomach. Why does drinking a solution of baking soda (a mild base) give her relief?
2. Bee Sting: A bee sting is acidic. What common household substance, like baking soda paste or calamine lotion (which is basic), would be effective in treating the sting? Explain the science.
3. Farming: A farmer tests his soil and finds that it is too acidic (low pH) for his crops to grow well. He decides to add slaked lime (calcium hydroxide) to his fields. How does this help?
4. Factory Waste: An industrial factory produces a large amount of acidic wastewater. Why must this water be treated with a base before it is released into a nearby river?
5. Tooth Decay: The bacteria in our mouth produce acids that can cause tooth decay. Toothpaste is generally basic. How does brushing your teeth with toothpaste help prevent decay?

G. True or False

1. All salts, like table salt, are neutral and have a pH of 7. _____
2. Mixing an acid and a base always produces a cold solution. _____
3. To neutralise a wasp sting (which is basic), you should apply vinegar (an acid). _____
4. Litmus is a natural indicator. _____
5. Water is a base because it is used to form a salt. _____