Indicators and its types

A. Fill in the Blanks

1. Acids turn _____ litmus paper to _____.
2. Turmeric is a _____ indicator which turns reddish-brown in a _____ solution.
3. Phenolphthalein remains _____ in acidic and neutral solutions.
4. The reaction between an acid and a base is known as a _____ reaction.
5. Bases feel _____ to the touch.

B. Match the Following;

Match the items in Column A with the correct description in Column B.

Column A	Column B
1. Lemon Juice	A. Basic in nature
2. Soap Solution	B. A synthetic indicator
3. Litmus	C. Acidic in nature
4. Phenolphthalein	D. A natural indicator
5. Neutralization	E. Reaction of an acid and a base

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

C. Practice Problems

Apply your knowledge of different indicators to solve these problems.

1. A student tests a sample of lemon juice. What color change would be observed with:
   - Blue litmus paper? _____
   - b. Turmeric paper? _____
2. You are given a clear solution of baking soda. What color change would you expect with:
   - Red litmus paper? _____
   - China rose indicator? _____
3. What is the effect of distilled water on:
   - Red litmus paper? _____
   - Blue litmus paper? _____
4. Phenolphthalein is a synthetic indicator. What color does it show in a solution of lime water (calcium hydroxide)?
5. A solution turns red litmus paper blue. What is the nature of this solution (acidic/basic)?

6. Ria spilled some curry on her white school shirt. When her mother washes the shirt with soap, the yellow stain turns reddish-brown. Explain why this happens.
7. What is the difference between a natural indicator and a synthetic indicator? Give one example of each.
8. You are given three unlabeled test tubes containing an acidic solution, a basic solution, and a neutral solution. If you are only given a strip of red litmus paper, how will you identify the contents of each test tube?
9. Why is it advised not to taste any unknown substance in the laboratory to check if it's an acid or a base?
10. Complete the table below:

Substance	Indicator	Original Color	Final Color	Nature of Substance
Shampoo	Blue Litmus	Blue		
Window Cleaner	Phenolphthalein	Colorless	Pink	
Orange Juice	China Rose	Light Pink		Acidic

D. Warm-up Questions

Answer these quick questions to refresh your memory.

1. What is the main purpose of an indicator?
2. Name two indicators that can be found in your kitchen.
3. What is the general taste of a basic substance?
4. What color does blue litmus paper turn when dipped in vinegar (acetic acid)?
5. Is a solution of sugar in water acidic, basic, or neutral?

E. Challenge Questions

Think critically to answer these higher-order questions.

1. An unknown colorless liquid is given to you. It shows no color change with phenolphthalein, but it turns blue litmus paper red. What can you conclude about the nature of this liquid? Justify your answer.
2. A farmer finds that the soil in his field is too acidic, which is affecting his crop yield. To fix this, should he add a substance that is acidic, basic, or neutral? Name a common substance he could use.
3. An indicator 'X' is extracted from the petals of a flower. When a few drops of 'X' are added to a soap solution, the solution turns green. When added to lemon juice, it turns dark pink (magenta). Can you identify the indicator 'X'?

4. You have two acidic solutions: hydrochloric acid and acetic acid (vinegar). Can you use litmus paper to determine which acid is stronger? Why or why not?
5. A student mixes solution 'A' (which turns phenolphthalein pink) with solution 'B' (which turns blue litmus red). The resulting mixture 'C' has no effect on either red or blue litmus paper. What is the chemical reaction called? What is the nature of the final solution 'C'?

F. Word Problems & Application

Connect your knowledge to real-life situations.

1. When an ant bites, it injects formic acid into the skin, causing a burning sensation. Why does applying a paste of baking soda on the affected area give relief?
2. People often take an antacid tablet (like Milk of Magnesia) when they suffer from indigestion. How does this help?
3. Factory waste is often acidic. Why must it be treated with a base like lime before being discharged into rivers?
4. You want to make a "magic" greeting card for a friend. You write a message on white paper with a solution of turmeric. The writing is not very visible. What could your friend apply to the paper to make the secret message appear in red?
5. Red cabbage juice is another excellent natural indicator. It turns reddish-pink in acidic solutions and greenish-yellow in basic solutions. What color would it turn if you added it to a glass of tap water containing soap?

G. True or False

1. Nitric acid is an acid, so it will turn red litmus paper blue. (True/False) _____
2. All substances in the world are either acidic or basic. (True/False) _____
3. China rose indicator turns green in an acidic solution. (True/False) _____
4. A solution that does not change the color of any indicator is always pure water. (True/False) _____
5. Toothpaste is generally acidic to help fight germs. (True/False) _____