

Using Acid-Base Indicators to Test Unknown Substances

BACKGROUND: The science laboratory is not the only place where acids and bases are found. Many items commonly found at home are acids and bases. For example, many of the foods you eat contain acids. Many commonly used cleaning products owe their effectiveness to the fact that they are alkaline, or contain bases.

Indicators are special chemicals that can show whether a given substance is an acid, a base, or neither. Indicators usually react with an acid or a base to form a slightly different chemical with a different color. Two examples of indicators are litmus paper (blue and red) and pH paper. Blue Litmus paper turns red in an acid and stays blue in a base. Red litmus paper turns blue in a base and stays red in an acid. One type of pH paper turns a different color at each of several pH values ranging from 2 to 10.

In this investigation, you will test a number of substances using litmus paper and pH paper.

PROCEDURE:

Note: Always use special caution when working with laboratory chemicals, as they may irritate the skin or cause staining of the skin or clothing. Never touch or taste any chemical unless instructed to do so.

1. Begin by obtaining a dropper bottle containing distilled water.
2. Using the Reaction Plates provided, place several drops of distilled water into three separate wells.
3. Test each well (one at a time) using *Red litmus paper*, *Blue litmus paper* and finally with *pH paper* (based on the color change you observe in the pH paper, approximate the pH). Record your results in the Data Table (following page).
4. Repeat steps 1 through 3 above substituting substances provided by your teacher. Be sure to write the names of the substances in the Data Table.

SUBSTANCE TESTED	Color of Indicator			APPROXIMATE pH of SUBSTANCE
	Blue Litmus	Red Litmus	pH Paper	
Distilled Water				

ANALYSIS AND CONCLUSION:

1. Which substances are acids?

2. Which substances are bases?

3. Which substances are neutral?

4. Which substance is probably the strongest acid? Explain your conclusion.
5. Which substance is probably the strongest base? Explain your conclusion.
6. Is litmus paper useful in determining the exact pH of a substance? Explain your answer.
7. Describe three situations in which acid-base indicators might be useful in everyday life.
8. Suppose you are manufacturing a certain type of cosmetic. You know that it can be slightly acidic, but it should not be strongly acidic. Which of the indicators you have just studied will help you determine the degree of acidity? Explain your answer.
9. You may have found that the results you obtained were different from those of other groups. What variables might have affected your results?
10. Design an experiment in which you could investigate which of two antacids is more effective in neutralizing stomach acid.

11. Using the pH scale below, place each of the substances you tested according to their measured pH values you recorded in your Data Table.

