

## Estimation of pH Lab

**Purpose:** Students will estimate the pH of a variety of classroom chemicals and everyday household items using acid-base indicators, pH paper, and litmus paper.

**Background:** There are several ways to test pH. One of the most important ways is by means of acid-base indicators such as phenolphthalein. In neutral and acidic solutions, phenolphthalein is colorless. In alkaline (basic) solutions, it is pink. By adding a few drops of a weak solution of the indicator to a solution to be tested, you can tell immediately whether the test solution is alkaline. Other acid-base indicators change colors at different pH values. By systematically testing a solution with a series of indicators, you can often arrive at a good estimate of the pH of a solution.

### Procedure Part A:

1. Add ten drops of each chemical solution to be tested to four different wells on the well plate.
2. Add one drop of phenolphthalein to one well for each sample. Record your observations.
3. Add one drop of methyl red to a second well for each sample. Record your observations.
4. Add one drop of bromothymol blue to a third well for each solution. Record your observations.
5. Use a glass rod to test each solution with litmus paper. Be sure to rinse your glass rod with distilled water and then dry it between each sample being tested. Record your observations.

### Procedure Part B:

1. Add ten drops of each household solution to be tested to four different wells on the well plate.
2. Repeat steps two through five from Part A of the procedure.

**Data Table 1: Common Acid-Base Indicators**

Indicator	Color in Acid	pH Range of Change	Color in Base
Phenolphthalein	Colorless	8.2-10.0	Pink
Methyl Red	Red	4.8-6.0	Yellow
Bromothymol Blue	Yellow	6.0-7.6	Blue

**Data Table 2: Indicator Reactions with Chemical Solutions**

Solution	Phenolphthalein	Methyl Red	Bromothymol Blue	Litmus Paper	Estimated pH
0.1M HCl					
0.1M CH <sub>3</sub> COOH					
Distilled H <sub>2</sub> O					
0.1M NH <sub>4</sub> OH					
0.1M NaOH					

**Data Table 3: Indicator Reactions with Household Chemicals**

Substance	pH GUESS (do this first!)	Phenolphthalein	Methyl Red	Bromothymol Blue	Litmus Paper	Estimated pH

## **Analysis:**

1. Draw a line below and create a pH scale. Label pH 0, 7 and 14. Write **acidic**, **basic** and **neutral** on the correct areas of the line.

2. Label the pHs and names of the 10 substances you tested on the pH scale you created above.

## **Conclusion:**

3a. Which **household chemicals** were acidic?

3b. Which was the strongest acid? How do you know?

4a. Which **household chemicals** were basic?

4b. Which was the strongest base? How do you know?

5. Which of the indicators used in this experiment could most accurately identify a neutral solution? EXPLAIN.

6. If you were to mix one of the acids with one of the bases, what 2 substances would be produced?

7. What is the reaction of an acid with a base called?