

Properties of Acids and Bases

Purpose

To classify substances as acids or bases using their characteristic properties.

To determine the pH values of the acids and bases used.

To examine the reactivity of acids with metals.

Equipment/Materials

safety goggles	hydrochloric acid
red and blue litmus paper	acetic acid
cabbage juice	sodium hydroxide
phenolphthalein	calcium hydroxide
bromothymol blue	copper
pH test paper	zinc
eyedroppers	iron
microtray	magnesium
500 ml beaker	samples of household substances
evaporating dish	

SAFETY

Many household cleaners and hydrochloric acid solution are corrosive or caustic. Any spills on the skin, in the eyes, or on clothing should be washed immediately with cold water. Report any spill to the teacher. Wear safety goggles at all times.

Procedure

Part A: Effects of Acids and Bases on Indicators

1. Place 5 drops of each of the following: hydrochloric acid, acetic acid, sodium hydroxide and calcium hydroxide into the wells of a microtray.
2. Using a different piece of clean and dry red litmus paper for each of the solutions, dip the end of a piece of red litmus paper into each solution. Record results in data table.
3. Using a different piece of clean and dry blue litmus paper for each of the solutions, dip the end of a piece of blue litmus paper into each solution. Record results in data table.

Part B: Determine the pH range of a substance

1. Use the bromothymol blue, phenolphthalein, pH test paper and cabbage juice to measure the pH of the samples.
2. Add 2 drops of the bromothymol blue indicator to each sample from part A. Record your observations in data table. Wash and dry microtray.
3. Add 2 drops of phenolphthalein indicator to each sample from part A. Record your observations in data table. Wash and dry microtray.
4. Determine the pH using a different piece of clean dry pH test paper for each of the solutions from part A. Compare colour of pH test paper to colours on container to determine the pH of each solution. Record your observations in data table.
5. Confirm your pH results by testing each sample with cabbage juice. Add 2 drops of the cabbage juice to each sample. Compare colours to control samples. Record your results in data table.
6. Wash and dry microtray.

Part C: Determine the Reactivity of Acids with Metals

1. Place a small sample of each metal to be tested in different wells of the microtray.
2. Use an eyedropper to add five drops of the hydrochloric acid onto each sample of metal. Note any signs of chemical change and record your observations in data table. Wash and dry microtray.
3. Place a small sample of each metal to be tested in different wells of the microtray. Add five drops of acetic acid onto each sample of metal. Note any signs of chemical change and record your observations in data table.
4. Wash and dry microtray.

Part D: Determine the Acidity and Alkalinity of Household substances

1. In different wells of your microtray, add 5 drops of each of the samples of household substances (make sure you know what substance is in which well).
2. Test each substance as you did in part A, using red and blue litmus paper. Record your observations in data table.
3. Test each substance as you did in part B, using pH test paper, phenolphthalein, bromothymol blue and cabbage juice. Record your observations in data table.

Questions

1. Why do you think that you needed to use both red and blue litmus paper?
2. How accurate are indicators for measuring pH? Which indicator(s) made the clearest distinction between an acid and a base? Explain.
3. What signs of chemical change were observed when acids were placed on metals?
4. Did all metals react similarly? Explain.
5. What was the purpose of testing water as well as samples of an acid and a base?
6. Why do you think there are so many different kinds of indicators?
7. List the general properties of acids and bases.