

Names: \_\_\_\_\_

## Neutralization Reaction Lab Video

**Purpose:** To produce and isolate a salt by neutralizing a base with an acid

**Introduction:** Early chemists discovered that sour acids and bitter bases combine to form a relatively bland-tasting salt. (CAUTION: Never taste a chemical in the laboratory). They explained this through the general reaction:



In this reaction, the  $\text{H}^+$  ions from the acid and the  $\text{OH}^-$  ions from the base combine to produce water ( $\text{H}_2\text{O}$ ). The products of the reaction do not have the properties of an acid or a base. The reaction is, therefore, called a neutralization reaction. In this experiment, you will use a neutralization reaction between an acid and a base to make a salt.

### Pre-Lab Questions:

1. Give the formula for hydrochloric acid: \_\_\_\_\_
2. Give the formula for sodium hydroxide: \_\_\_\_\_
3. Hydrochloric acid would be classified as a (circle the correct one): strong acid or weak acid
4. Sodium hydroxide would be classified as a (circle the correct one): strong base or weak base

### Safety:

- Wear your safety goggles and lab apron at all times
- Hydrochloric acid and sodium hydroxide can both cause chemical burns and caution should be used when in use
- Use tongs to handle all hot materials
- Use care when working with an open flame, including but not limited to tying hair back and no loose clothing.

**Materials:** beaker, Bunsen burner, ring stand, beaker tongs, iron ring, wire mesh, striker, watch glass, stirring rod, evaporating dish, 1M hydrochloric acid, 1M sodium hydroxide, pH paper, phenolphthalein solution

### Procedure:

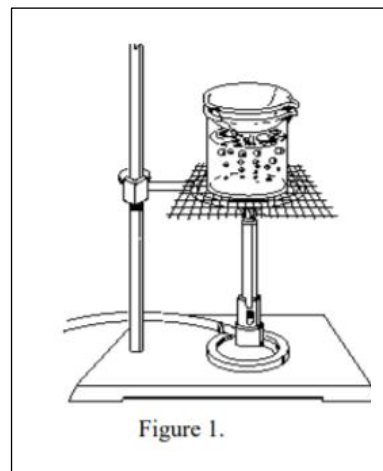
*The following procedure will be conducted for you in the video. Follow along with the procedure as you watch the video.*

#### Part 1: Starting pH

1. Rip off a piece of pH paper that is approximately 1 in in length. Rip this piece of pH in half, giving you two approximately  $\frac{1}{2}$  in pieces of pH paper. Place each piece on opposite side of the watch glass.
2. Using the dropper, place one drop of 1M hydrochloric acid on one of the pieces of pH paper
3. Using the pipette, place one drop of 1M sodium hydroxide on the other piece of pH paper
4. Using the chart on the pH paper, record the pH of each sample into Data Table 1 out to 1 decimal point. Note: You will have to estimate the decimal point.
5. Complete the remaining calculations for Data Table 1.

## Part 2: Neutralization Reaction

1. Fill a beaker approximately 75% full of water.
2. Set up the ring stand as shown in Figure 1.
3. Light the Bunsen burner using the appropriate procedure and place the beaker with water on the set-up. Allow the water to reach boiling. Continue with lab while waiting for water to boil.
4. Add two complete pipettes full (approximately 2 mL) of 1M sodium hydroxide into a clean evaporating dish.
5. Add 1 drop of phenolphthalein indicator to the evaporating dish with the sodium hydroxide in it. Record your observations in Data Table 2.
6. Add, drop by drop, 1M hydrochloric acid to the evaporating dish using the dropper. Using the stirring rod, stir constantly while adding the acid. Continue adding the hydrochloric acid until the color of the solution disappears within one drop. Then, add one more drop. Record your observations in Data Table 2.
7. Using tongs, carefully place the evaporating dish over the boiling water, as shown in Figure 1.
8. Allow solution to evaporate completely, leaving only a solid behind.
9. Turn off the Bunsen burner. Using the tongs, remove the beaker with the evaporating dish and place it on the table. Allow the ring stand setup to cool completely before disassembling it.
10. Using the tongs, remove the evaporating dish from the beaker and place it on the table. Examine the residue in the evaporating dish. Record your observations in Data Table 2.



**Data Table 1**

Substance	pH	pOH	[H <sup>+</sup> ]	[OH <sup>-</sup> ]
hydrochloric acid				
sodium hydroxide				

**Data Table 2**

Step	Observations
5	
6	
10	

**Analysis Questions:**

1. Write the balanced chemical equation for the neutralization reaction you watched in this video. (Hint: your reactants were hydrochloric acid and sodium hydroxide; you know they produced water and a salt. The salt is made up of the elements not used to make the water.)
  
2. How could you determine whether the phenolphthalein remains in the residue of the reaction? Think about how you would make the phenolphthalein visible again. Describe what you would do. Use complete sentences.
  
3. Based on your knowledge of neutralization reactions, is the salt produced from the reaction in the lab acidic, basic, or neutral? Why? Use complete sentences.
  
4. How could you determine whether your salt was your answer to question number 3? Think about how you could test the salt to find out if it's acidic, basic, or neutral. Describe what you would do. Use complete sentences.