Name: _____ Period: _____ Date: _____

Neutralization Lab Activity - Student Edition

Antacids

Background Information:

When an acid and a base cancel each other out, this is known as neutralization. It follows the reaction pattern:

Acid + Base → Water + Salt

Neutralization is the concept used to treat indigestion, a common and uncomfortable digestive condition. Antacids can be found as powder or tablets and contain a base of approximately pH 10. This is strong enough to cure indigestion, but not strong enough to damage the digestive system.

This lab activity uses the indicator methyl orange. It is reddish in color in strong acids of pH 0-2, orange in acids of pH 3-4 and gradually changes to yellow by pH 7.

Learning Objectives:

- Explore the process of neutralization.
- Measure the amount of antacid needed to neutralize dilute hydrochloric acid.
- Use indicators to measure the pH of a substances.

Pre-Lab Questions:

1. Define neutralization.

   _____

   _____

2. Which part of the gastrointestinal system involves indigestion?

   _____

3. List the evidence you would expect to see in a chemical reaction.

   _____

   _____

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Equipment Needed:

- Dilute hydrochloric acid (0.1M)
- Methyl orange indicator
- Antacid powder
- White piece of paper
- Safety goggles
- Gloves
- Petri dish
- Erlenmeyer flask (250mL)
- Measuring cylinder (50mL)
- Spatula
- Electronic balance

Method:

1. Place the Petri dish on the balance.
2. Place two spatulas of antacid powder into the dish and record the mass of the dish and the antacid.
3. Use a measuring cylinder to measure 50mL of hydrochloric acid. Transfer the acid to the Erlenmeyer flask.
4. Add 3-4 drops of methyl orange indicator. Record the color and predict the pH of the acid.
5. Place the white sheet of paper under the Erlenmeyer flask.
6. Use the spatula to add the antacid in small amounts to the acid. Swirl the flask in between each addition.
7. Once the indicator has turned yellow, stop adding antacid powder.
8. Use the electronic balance to measure the mass of the unused antacid powder. Record the results in the table.

Results:

Mass of the Petri dish and antacid (M_1)	
Mass of the Petri dish and unused antacid (M_2)	
Mass of the antacid used (M_1- M_2)	

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Post-Lab Questions:

1. How much antacid is needed to neutralize the hydrochloric acid?

   _____

2. If your stomach contained 1 liter of acid, how much antacid would be needed to neutralize this amount of acid. Show your working.

   _____

   _____

3. Why was hydrochloric acid used in this experiment, rather than another acid?

   _____

   _____

4. Why was methyl orange used in this experiment rather than another indicator like phenol red?

   _____

   _____

5. Use the basis of this lab activity to design an experiment to compare the effectiveness of different antacid powders or tablets. You will need to make sure that it is a fair test.

   _____

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