Name Date Class

LAB

Design Your Own

Be a Soda Scientist

LAB A

Background

The next time you drink a soft drink, take a look at the ingredients label. Carbonated soft drinks contain carbonic acid and sometimes contain phosphoric acid.

Question

Using a proper indicator and a base solution, how can you compare the acidity levels in soft drinks?

Form a Hypothesis

Based on your knowledge of acids and bases, develop a hypothesis about how neutralization reactions can be used to rank the acidities of soft drinks.

Possible Materials

different colorless soft drinks (3)
test-tube holder
test tubes (3)
25-mL graduated cylinder
droppers (2)
1% phenolphthalein
dilute NaOH solution (0.1M)

Objectives

- **Observe** evidence of a neutralization reaction using an indicator.
- **Compare** the acidity levels in three soft drinks.
- **Design** an experiment that uses the independent variable of acid content of soft drinks and the dependent variable of amount of base added to the soft drinks to determine the acidity of the drinks.

Safety Precautions

WARNING: ***Sodium hydroxide is caustic. Wear eye protection and avoid any skin contact with the solution. Flush thoroughly under a stream of water if any of the NaOH touches your skin. Keep your hands away from your face.***

Make a Plan

- ❑ **1.** Read the procedure and safety information, and complete the lab form.
- ❑ **2.** As a group, agree upon and write the hypothesis statement.
- ❑ **3.** In a logical manner, provide the specific steps that you will use to test your hypothesis.
- ❑ **4.** Name all of the materials that you will need to test your hypothesis.
- ❑ **5.** Design a data table that will allow you to record the amount of NaOH that was required to neutralize each soda sample.
- ❑ **6.** Decide how much soda should be tested in each trial as a control and how many times to repeat each trial.
- ❑ **7.** Predict whether you can test only colorless solutions with this procedure, and explain why.

Name _____ Date _____ Class _____

LAB (continued)

LAB A

Follow Your Plan

- ❑ 1. Make sure your teacher approves your plan before you begin.
- ❑ 2. Observe the color change of phenolphthalein at the endpoint of each titration.
- ❑ 3. While doing the experiment, write your observations and complete the data table.

	NaOH Required to Neutralize Soda Samples
Soda 1	
Soda 2	
Soda 3	

Analyze Your Data

1. **Classify** the soft drinks that you tested based on their acidities. Rank them in the order of most acidic to least acidic.

2. **Explain** how you determined the ranking.

Conclude and Apply

1. **Evaluate** the results. Do they support your hypothesis? Explain why or why not.

2. **Predict** At warmer temperatures, less gas dissolves in a liquid. How would this affect the results of an experiment comparing two sodas stored at different temperatures?

Communicate Your Data

Calculate Compile the data from your class groups in a table or spreadsheet. Discuss reasons your data might differ from the class average.