Activity

Design Your Own Experiment

Be a Soda Scientist

Lab Preview

Directions: *Answer these questions before you begin the Activity.*

1. What is NaOH solution?

2. What is the purpose of phenolphthalein?

Carbonated soft drinks contain carbonic acid and sometimes phosphoric acid. You have learned that bases can neutralize acids. Using a proper indicator and a base solution, how could you compare the acidity levels in soft drinks?

Recognize the Problem

How can the acidity level of soft drinks be compared effectively?

Form a Hypothesis

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

Possible Materials

different colorless soft drinks (2)
test tubes (2)
25-mL graduated cylinder
droppers (2)
1% phenolphthalein indicator solution
dilute NaOH solution

Goals

- **Observe** evidence of a neutralization reaction using an indicator.
- **Compare** the acidity levels in two different 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

CAUTION: *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.*

Test Your Hypothesis

Plan

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

Activity (continued)

Do

1. Make sure your teacher approves your plan before you start.
2. What color change does the indicator phenolphthalein undergo in a solution that changes from an acidic pH to a basic pH?
3. While doing the experiment, record your observations and complete the data table.

Analyze Your Data

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

2. Can your acidity values be compared with those of other groups if they used different amounts of soda?

Draw Conclusions

1. Did the results support your hypothesis? Explain why or why not.

2. 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?

Communicating Your Data

Compare your soda rankings with those of other class groups. **Discuss** possible reasons for any differences observed. **For more help, refer to the Science Skill Handbook.**