

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Class Period: \_\_\_\_\_

Supplies for each pair of students:

- 6 containers
  - 2—containing 20 mL of red cabbage juice
  - 1—containing 20 mL of lemon juice
  - 1—containing 20 mL of vinegar
  - 1—containing 20 mL of ammonia-based window cleaner
  - 1—containing 20 mL of baking soda
- 3 cotton swabs
- 1 spoon
- 2 index cards
- 2 pencils

Procedure Part I—Invisible Ink:

1. Each student should take one index card. Fold the index card in half, bringing the two short sides of the card together. Unfold the index card and place it line side down.
2. Near the bottom of the left side of the card, write “Vinegar.” On the right side, write “Window Cleaner.”
3. On the left side of the card, paint a simple design using a cotton swab and vinegar. On the right side, paint a simple design using the second cotton swab and window cleaner. **Do not dip the same cotton swab in both liquids.** Designs such as a star or smiley face work best.
4. Set the cards aside to dry.

Acids and Bases:

1. Definitions:

a. Acid: \_\_\_\_\_

\_\_\_\_\_

b. Base: \_\_\_\_\_

\_\_\_\_\_

c. Indicator: \_\_\_\_\_

\_\_\_\_\_

2. Why are acids and bases important? \_\_\_\_\_

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\_\_\_\_\_  
\_\_\_\_\_

3. How do engineers use acids and bases? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

4. How were acids and bases used during the American Revolution? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

5. Using cabbage juice as an indicator, how can one tell if a chemical is an acid or base? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Procedure Part II—Reactive Liquids:

1. Pipette some lemon juice and add several drops to **one** cup of cabbage juice. Stir the solution with the **handle** end of the spoon.

Observations: \_\_\_\_\_

\_\_\_\_\_

Is lemon juice an acid or base? \_\_\_\_\_

2. Spoon a small amount of baking soda into the lemon juice/cabbage juice solution. Stir the solution with the **handle** end of the spoon.

Observations: \_\_\_\_\_

\_\_\_\_\_

Is baking soda an acid or base? \_\_\_\_\_

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Procedure Part III—Reappearing Ink:

1. Hypothesize whether vinegar and window cleaner are acids or bases. Write your hypothesis for each liquid on your index card below where you wrote what the liquid was.
2. Make sure that the index card is dry.
3. Dip the third cotton swab into the untouched cabbage juice. Swab the cabbage juice over the now invisible designs and observe what happens.

Observations: \_\_\_\_\_

\_\_\_\_\_

Is vinegar an acid or base? \_\_\_\_\_

Is window cleaner an acid or base? \_\_\_\_\_