

# Kitchen Chemistry: Acid & Base Detectives!

## Lesson Steps:

### 1. Introduction: What are Acids and Bases? (10 minutes)

Ask the student: Have you ever tasted something sour, like a lemon? Or something slightly bitter, like baking soda? Those tastes can be clues about chemicals called acids and bases! Acids often taste sour, while bases can taste bitter and feel slippery. Today, we're going to be Chemistry Detectives and learn how to tell if common kitchen items are acids or bases using a special secret agent tool we make ourselves!

### 2. Activity Part 1: Making Our Secret Indicator! (20 minutes)

**Safety First:** Adult supervision is needed for chopping and using the stove/microwave.

- 1. Prepare the Cabbage:** Carefully chop the red cabbage into small pieces (or blend briefly with a little water). The smaller the pieces, the more color we can get out!
- 2. Extract the Color:** Place the cabbage pieces in a pot (or microwave-safe bowl). Add about 2 cups of water, just enough to cover the cabbage.
- 3. Heat it Up:**  
Stove: Bring the water to a boil, then reduce the heat, cover, and simmer for about 10-15 minutes until the water is deeply colored purple. Let it cool slightly.  
Microwave: Heat on high for 5-7 minutes (watch carefully). The water should turn deep purple. Let it cool slightly.
- 4. Strain the Juice:** Carefully pour the cooled cabbage and water through a strainer (or coffee filter) into a bowl or pitcher. Press the cabbage gently to squeeze out extra juice. This purple juice is our 'Secret Indicator'!
- 5. Explain:** Tell the student this purple juice is amazing because it changes color when it meets an acid or a base. It 'indicates' what type of substance it is!

### 3. Activity Part 2: Detective Time - Testing Our Substances! (20-25 minutes)

- 1. Set up the Test Station:** Line up the clear cups or jars. Pour a small amount of the purple cabbage indicator juice into each cup (about 1/4 full).
- 2. Prepare Samples:** Make sure liquid samples (lemon juice, vinegar, milk, soda, soapy water, tap water) are ready. If using baking soda, mix about 1 teaspoon into 1/2 cup of water.
- 3. Make Predictions (Optional):** Ask the student to guess if each substance will be an acid or a base before testing.
- 4. Test Each Substance:** Using a clean dropper or spoon for each substance, add a small amount (a few drops or a tiny spoonful) of one test item into one cup of indicator juice. Do this one by one for all test items.
- 5. Observe and Record:** Watch closely! What happens to the color of the indicator?
  - **Acids** will turn the indicator shades of **pink or red**.
  - **Bases** will turn the indicator shades of **blue, green, or even yellow** if very strong.
  - **Neutral** substances (like plain water) will leave the indicator close to its original **purple** color.

Write down the starting substance and the final color on the paper or chart.

- 6. Discuss Results:** Look at the results together. Which substances were acids? Which were bases? Were any neutral? Were the predictions correct?

#### 4. Conclusion & Clean Up (10 minutes)

**Review:** Let's review! What did we learn today? Acids turn the indicator...? (Pink/Red!). Bases turn it...? (Blue/Green/Yellow!). Our red cabbage juice was a natural chemical indicator.

**Real-World Connection:** Talk briefly about where acids and bases are found. Acids are in citrus fruits, vinegar, and our stomachs! Bases are in soaps, baking soda, and cleaning supplies.

**Evaluation:** Ask the student to name one acid and one base they found during the experiment and describe the color change they saw.

**Clean Up:** Pour the used liquids down the sink (they are safe household items) and wash the cups and equipment.