

## THE BLUE AND RED CABBAGE

**A. Question:** *What is the purpose of an indicator in chemistry experiments?*

### **B. Materials Needed:**

1. Few leaves of red cabbage.
2. A small beaker and four test tubes.
3. Test tube rack.
4. An alcohol burner and stand.
5. Vinegar, lemon juice, baking soda, lime.

### **C: Procedure:**

1. Cut a red cabbage leaf in small pieces; place it in the beaker and add about 10mL of water to it.
2. Heat it above the burner until boiling, then pour equal amounts of the liquid in the liquid in the four test tubes.
3. Place a few drops of vinegar in the first and a few drops of lemon juice in the second test tube. Have the students observe closely the color of the liquid.
4. Add a pinch of baking soda to the third and a pinch of lime to the fourth test tube. Observe the color change!

### **D: Anticipated Results:**

The students should expect to observe a color change when they add the different liquids such as vinegar, lemon juice, baking soda and lime to the test tubes containing the red cabbage mixture.

### **E: Thought Questions for Class Discussion:**

1. Which two chemicals colored the cabbage juice red?
2. Which two chemicals colored the cabbage juice blue?
3. What would happen if we added baking soda to the cabbage leaf?
4. To which of the two groups of chemicals would orange juice belong? Pineapple juice? Grape juice? Soap water?
5. What would happen if we added vinegar to the blue liquid?

### **F: Explanation:**

The red cabbage juice acts like litmus, which is an indicator that turns red in acids and blue in bases. Vinegar, lemon juice and other sour tasting juices are all acids; whereas baking soda, lime and soap water are bases. Chemists utilize a scale denominated the pH scale in order to determine if a substance is basic or acidic. The pH scale will be dealt with in higher grades, and it is the negative logarithm of the hydrogen ion concentration. A pH of 7 indicates that the liquid is neutral, a pH less than 7 indicates acidity and a pH higher than 7 indicates a basic liquid.

Other common indicators are: litmus paper, phenolphthalein, methyl orange and methyl red.