**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**LAB: Making a pH indicator**

**PURPOSE:** To produce a pH indicator out of pieces of red cabbage and to test its effectiveness.

**BACKGROUND INFORMATION:**

A pH indicator is a substance that has a different color when added to acid or base. You will be making an indicator using red cabbage. Red cabbage contains an indicator pigment molecule called flavin. This water-soluble pigment is also found in apple skin, red onion skin, plums, poppies, blueberries, cornflowers, and grapes. Very acidic solutions will turn this pigment a red color. Neutral solutions will result in a purplish color; basic solutions will appear greenish-yellow. Therefore, it is possible to determine the pH of a solution based on the color it turns the flavin pigment in red cabbage juice.

**MATERIALS:**

3-4 pieces Red Cabbage

Standard Solutions: pH 2-11

Sprite

White Vinegar

Tap Water

Distilled water

Salt Water

Rubbing Alcohol

409

Tums (soln. in water)

Bleach

Hydrogen Peroxide

250 mL beaker

Hot Plate

Pipet

Well Plate

**PROCEDURE:**

*Part I: Making the Indicator*

1. Turn the hot plate on a High Setting (at least 7)
2. Place about 100 mL of tap water in a beaker.
3. Place the beaker on the hot plate, and let the water boil

UNTIL YOUR WATER BOILS, YOU SHOULD BE GATHERING CHEMICALS IN YOUR WELL PLATE AS INDICATED PART II. (next page)

1. Once your water is boiling, add 3-4 pieces of red cabbage into the boiling water (you may want to tear it into smaller pieces)
2. Boil for about 5 minutes.
3. Turn off the hot plate and allow the beaker to cool for about 10 minutes.

IN THIS TIME, FINISH GATHERING CHEMICALS IN YOUR WELL PLATES!

*Part II: Testing the Indicator*

1. Add 2 pipetfuls of each of the chemicals. It should be in your well plate as shown below. Be sure to place the pipet back into the appropriate beaker or container.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Standard pH=2 | Standard pH=3 | Standard pH=4 | Standard pH=5 | Standard pH=6 | Standard pH=7 |
| Standard pH=8 | Standard pH=9 | Standard pH=10 | Standard pH=11 |  |  |
| Sprite | White Vinegar | Tap Water | Distilled Water | Salt Water | Rubbing Alcohol |
| 409 in solution | Tums in Solution | Bleach | Hydrogen Peroxide |  |  |

1. After your cabbage juice has cooled you can begin testing. Add 1-2 pipetfuls of cabbage indicator (or until the color changes)
2. Record the color changes below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Substance Tested** | **Color of Red Cabbage Indicator** |  | **Substance Tested** | **Color of Red Cabbage Indicator** |
| pH=2 standard |  |  | Sprite |  |
| pH=3 standard |  |  | White Vinegar |  |
| pH=4 standard |  |  | Tap Water |  |
| pH=5 standard |  |  | Distilled Water |  |
| pH=6 standard |  |  | Salt Water |  |
| pH=7 standard |  |  | Rubbing Alcohol |  |
| pH=8 standard |  |  | 409 in Solution |  |
| pH=9 standard |  |  | Tums in Solution |  |
| pH=10 standard |  |  | Bleach |  |
| pH=11 standard |  |  | Hydrogen Peroxide |  |

**QUESTIONS:**

1. Make a chart or scale that relates the pH number to the corresponding color. Use your pH standards. Label on the chart where you have either acid, base, neutral.

Cabbage Indicator pH Scale

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **COLOR** |  |  |  |  |  |  |  |  |  |  |
| **pH** |  |  |  |  |  |  |  |  |  |  |
| **Type of Substance** |  |

1. Which of the substance with unknown pH values were acids, bases, or neutral?

|  |  |  |
| --- | --- | --- |
| **ACID** | **BASE** | **NEUTRAL** |
|  |  |  |

1. Based on your pH scale, which substance was the MOST acidic?
2. Based on your pH scale, which was substance was the MOST basic?
3. Based on your pH scale, which substance was the MOST neutral?
4. Using your values, approximately how much more acidic was the sprite than the salt water?
5. Using your values, approximately how much more basic was the bleach than the baking soda?