Honors Biology Quarter 1 Project

**Acids And Bases**

**Purpose**

To determine which chemicals are acids and which are bases.

**Additional information**

An acid, represented by the formula HA, is a chemical compound that, when dissolved in water, results in a solution whose hydrogen ion activity is greater than in pure water (a pH less than 7.0). It wasn't until the 17th century that an acid was properly defined. Amateur chemist Robert Boyle defined acids as having the properties of sour taste, corrosiveness to materials, and becoming less acidic when mixed with bases.   
  
A base, at least one interpretation of a base, is a chemical that is opposite of acids. When a base is added to an acid, neutralization occurs. Where-as acids increase the hydronium ion concentration in water, bases decrease it (opposite effect of an acid). According to Boyle, bases have a slippery feeling and become less basic when mixed with acids.

**Required materials**

* Red cabbage leaves
* Water
* Bowl
* Colanders (food strainer)
* Vinegar
* Lemon juice (fresh squeezed or lemonade)
* Bicarbonate of soda (aka: baking soda)
* Laundry detergent
* Toothpaste
* Gatorade
* Several cups or glass jars of the same size
* Eye-dropper (optional)

**Estimated Experiment Time**

About 45 minutes to an hour

**Step-By-Step Procedure**

* **1.** Cut your cabbage leaves into small pieces.
* **2.** Boil several cups of water. They'll need to be enough water to submerge your cut cabbage pieces later on.
* **3.** Place your cut cabbage in a bowl. Pour the boiling water into the bowl. Let the cabbage pieces soak for at least thirty minutes (your water should become a dark-purplish color).
* **4.** Separate the cooled "cabbage juice" from the leaves. You can either take the cabbage out with a holed-spoon or pour the bowl of cabbage juice into a strainer over another bowl, allowing the strainer to filter-out the cabbage pieces.
* **5.** Line up your glass jars, about one or two inches apart. Pour some of each chemical (vinegar, lemon juice, bicarbonate of soda, laundry detergent, toothpaste, and gatorade) into each jar.
* **6.** Now it's time to test if your chemical is an acid or a base. Pour a dash of your cabbage juice into each jar/vial. To avoid pouring too much, you may want to use an eye-dropper. You may also need to swirl your mixture around a bit. What happens to each mixture of cabbage juice and chemical? If your mixture turned pink, your chemical is an acid. If your mixture turns blue or green, your chemical is a base.

**Note**

This is an interesting and safe experiment that can be conducted right in your own kitchen with commonly available household items. If you're having difficulty getting your "cabbage juice" to work as a proper indicator, it's possible you didn't let it soak long enough. It's recommended to let it soak a minimum of thirty minutes, but waiting an hour will be the most effective.

Lab Report Template

# Title:

\*a brief, concise descriptive title

# Introduction:

\*background information

\*purpose

\*Hypothesis

# Materials:

\*make a list of ALL items used in the lab experiment.

\*Example:

1. 100mL beaker
2. Four test tubes
3. A test tube rack
4. Thermometer

# Procedure:

\*Write a paragraph (complete sentences) which explains what you did in the lab.

\*Your procedure should be written so that anyone else can repeat the experiment. (Write the procedure in your own words. DO NOT COPY FROM YOUR LAB MANUAL PAPER!!!!

# Results:

\*This section should include any data tables (charts, graphs), observations, pictures and mathematical calculations.

\*All data tables and pictures must be label correctly.

# Discussion (Analysis)

\*Analyze your results. What do your results mean?

# Conclusion

\*Summary of the data to help the reader understand your results. (2 paragraphs)

\*Accept or Reject your hypothesis and explain why.

\*Mention any errors that were made and if the errors had a major impact on the results.

\*List one thing you learned and describe how it applies to a real-life situation.