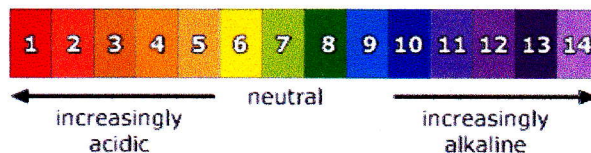


Red Cabbage Lab: Acids and Bases

Introduction:

Liquids all around us have either acidic or basic (alkaline) properties. For example, acids taste sour; while, bases taste bitter and feel slippery. However, both strong acids and strong bases can be very dangerous and burn your skin, so it is important to be very careful when using such chemicals. In order to measure how acidic or basic a liquid is, one must use the pH scale as illustrated below:



The strength of the pH scale is determined by the concentration of hydrogen ions (H^+) where a **high concentration** of H^+ ions indicate a **low** pH and a **low concentration** of H^+ ions indicate a **high** pH. The pH scale ranges from 1 to 14 where 1 to 6 is classified as acidic, 7 neutral (neither a base or an acid) and 8 to 14 is classified as basic.

In this lab, you will use the juice from red cabbage as a pH indicator to test common household liquids and determine their pH levels. You will mix cabbage juice with different household liquids and see a color change produced by a pigment called flavin (an anthocyanin) in red cabbage. Through this color change, you will be able to successfully identify the approximate pH of common household liquids using the table below:

Color:	Pink	Dark Red	Violet	Blue	Blue-Green	Green-Yellow
Approx. pH	1-2	3-4	5-7	8	9-10	11-12
Acid/Base	Acid	Acid	Acid/Neutral	Base	Base	Base

Strength increases at extremes of this scale.

Materials:

Pre-Cut Cabbage
Blender
Strainer
Large Container
~1L Beaker
7 plastic cups
7 plastic spoons

Liquids to Test:

- Lemon Soda
- White Vinegar
- Apple Juice
- Baking Soda
- Shampoo (preferably clear)
- Conditioner (preferably clear)
- Hand Sanitizer

Pre-Laboratory Predictions:

Look at each of the liquids being tested. Predict whether each of the substances is acidic, neutral or basic. Circle one. (Think about the properties of acids and bases.)

Hand Sanitizer	Acidic	Neutral	Basic
Lemon Soda	Acidic	Neutral	Basic
Apple Juice	Acidic	Neutral	Basic
White Vinegar	Acidic	Neutral	Basic
Baking Soda	Acidic	Neutral	Basic
Shampoo	Acidic	Neutral	Basic
Conditioner	Acidic	Neutral	Basic

Liquid:	Color Change/ pH	Actual pH
Hand Sanitizer		
Lemon Soda		
Apple Juice		
White Vinegar		
Baking Soda		
Shampoo		
Conditioner		

Now look up the actual pH of each of the substances and see how accurate the cabbage juice indicator was!

How did your reasoning for your predictions change after seeing the approximate pH level?

8. Categorize your results below:

Strong Acids	Weak Acids	Neutral	Weak Bases	Strong Bases

Real Life Applications:

1. Neutralization: Whenever you mix an acid with a base, they neutralize each other. If this is the case, why is Alka-Seltzer used to treat stomach aches? (Note: excess stomach acids cause stomach aches)

2. Acid Rain: What is acid rain and how is it a problem to oceans, rivers, lakes, ponds ect.?