

Record: 1

Title: This week's LabZone activity.
Source: Science News for Kids; 8/8/2007, p2-2, 1p
Document Type: Science Experiment
Subject Terms: PH effect
HYDROGEN-ion concentration
CABBAGE
ANTHOCYANINS
SOLUTION (Chemistry)
CHEMICAL reactions

Abstract: The article describes an experiment that uses a cabbage juice indicator to test the pH of different solutions. There are several types of indicators, some are liquids and some are concentrated on strips of litmus paper. Indicators can be extracted from different sources. Red cabbage contains an indicator pigment molecule called flavin, which is one type of molecule called an anthocyanin. Very acidic solutions will turn anthocyanin a red color. Neutral solutions result in a purplish color. Basic solutions appear in greenish-yellow.

Lexile: 1040

Full Text Word Count: 446

Accession Number: 26136913

Database: Middle Search Plus

This week's LabZone activity

Cabbage Acid Test Objective

Make your own pH indicator and use it to test for acids and bases with various household solutions.

Introduction

A solution is a mixture of a soluble chemical dissolved in water. Think about the difference between salt water and tap water. The salt in the salt water has dissolved and the solution looks clear, but the salt is still there and will taste salty if you taste it. Because solutions are made with water, which is made of hydrogen and water, the hydrogen in the water can make a solution into an acid or a base.

You might think about an acid as something that an evil villain uses to trap a super hero, but actually some very common household solutions are acids. Acids are solutions that will donate hydrogen ions in a solution, and usually taste sour. Some common acids are citrus fruit juices and household vinegar. Bases are solutions that accept hydrogen ions in solution, and usually feel slippery. Bases have many practical uses. "Antacids" like TUMS or Rolaids are used to reduce the acidity in your stomach. Other bases make useful household cleaning products.

How do you tell if something is an acid or a base? You use a chemical called an indicator, which changes in color when it goes from an acidic to basic condition. There are many different types of indicators, some are liquids and some are concentrated on little strips of "litmus" paper. Indicators can be extracted from many different sources, including the pigment of many plants.

Red cabbage contains an indicator pigment molecule called flavin, which is one type of molecule called an anthocyanin. This water-soluble pigment is also found in apple skin, red onion skin, plums, poppies, blueberries, cornflowers, and grapes. Very acidic solutions will turn anthocyanin a red color. Neutral solutions result in a purplish color. Basic solutions appear in greenish-yellow. Therefore, it is possible to determine the pH of a solution based on the color it turns the anthocyanin pigments in red cabbage juice.

In this experiment, you can extract your own cabbage juice indicator and use it to test the pH of different solutions around your home. You might be surprised to find out what common items around your house are acids or bases.

Experimental Procedure and Additional Information

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Sohn, Emily. 2006. A sour taste in your mouth. Science News for Kids (Aug. 30). Available at

<http://www.sciencenewsforkids.org/articles/20060830/Note3.asp>.

LabZone

Basic Soap

<http://www.sciencenewsforkids.org/articles/20030820/LabZone.asp>

ScienceFairZone

Browning in Apples

<http://www.sciencenewsforkids.org/articles/20070221/ScienceFairZone.asp>

For more science project ideas, go to http://www.sciencebuddies.org/mentoring/areas_of_science.shtml.

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