

The Power of Colorful Fruits and Vegetables

You have heard it more than once: eat more fruits and vegetables! Do you wonder why? Are your parents, grandparents, teachers, and cafeteria personnel just trying to annoy you? Scientists are studying how the different chemical compounds found in fruits and vegetables may help fight diseases such as heart disease or cancer. Researchers may use animal studies or surveys of specific groups of people to help answer those questions. You can also investigate some of the chemical and biochemical properties of compounds found in colorful fruits and vegetables.

Think about it....

1. A friend who was getting paid to clean up after a big party just texted you to say that pouring some left over purple grape juice into a glass of water with a lemon slice turned the water a pink-red color! What are your beginning ideas about what could cause this?

To help you think about this question, it might help to consider what could be different about the purple grape juice and the water in a glass of water with lemon juice in it?

2. What testable question(s) do you have about purple grape juice and other fruit/vegetable juices and water solutions? To help you organize your thoughts, record your discussions with your classmates by writing comments in the following three columns.

In planning your test, consider a variety of fruit or vegetable juices to test and different types of water or water in juices to test. For example, fruit juices could be grape, cherry, cranberry, blueberry, or the liquids from red onions, red cabbages, radishes, etc. The water samples could include different types of water or water in almost colorless juices like lemon juice.

What is the testable question about fruit/vegetable juice and liquids with water?	What is your test procedure? What materials are needed? What data should be collected?	Do you want to compare the tested results to a control? How will data be organized?

3. Use the following pages to organize and summarize your science work.

Student name: _____

Date: _____

Science Research Summary

The investigating scientists are:

Our Question(s) — What we want to find out?

Our Test(s) — How we plan to find out?

We plan the following test:

Our Materials

Our Observations and Data (Results)

We plan to collect the following data:

We organize this data in the following data table to allow us to make a claim:

Student name: _____

Date: _____

Our Claim

From our test (experiment) and data (results) we claim:

Our Evidence

Our claim is supported by the following evidence:

Our Reasoning

Our claim and evidence are linked or supported by the following science reasoning:

Our Readings and Discussions — How do our results fit with what others know or have found out?

Our claim, evidence or reasoning fits because we heard:

Our claim, evidence or reasoning fits because we read:

Our Reflection

After working on this question or test we now know and wonder about:

Student name: _____

Date: _____

The Science Behind Your Investigation

In this investigation you explored the reaction of the highly colored red/purple chemicals (anthocyanins) in fruits and vegetables with different solutions that contain water. Depending on what substances you tested the water solutions contain different amounts of hydrogen ion, H^+ . Chemists describe the water solutions as having different pH or “power” of the hydrogen ion concentration. Solutions that have a hydrogen ion concentration greater than 1×10^{-7} are acids and their pH is less than 7. Solutions that have a hydrogen ion concentration less than 1×10^{-7} are bases and their pH is greater than 7. In fruits and vegetables, the reddish colored form of the anthocyanins, [AH] is observed in fruits and vegetables that are acidic to slightly acidic. The anthocyanin acid-base reaction could be written: $AH \rightleftharpoons A^- + H^+$, where A stands for the anthocyanin. (Note: To be more correct, a bare hydrogen ion H^+ probably does not exist in water, so it is probably better represented as the hydronium ion H_3O^+ .)

In the next activity, you will explore the important antioxidant properties of anthocyanins.