

1. Do different varieties of the same fruit have the same level of vitamin C?

What about different brands of orange juice? Or fresh juice compared to juice from frozen concentrate? Does the way a fruit is stored or how long it is stored change the level of vitamin C?

Background Info: Most birds and animals make their own vitamin C. But a few species, like people and guinea pigs, must get it from their food. Good sources of vitamin C are citrus fruits like oranges and grapefruit, strawberries, green peppers, broccoli and potatoes. Vitamin C is required for the body to make and maintain collagen, a protein. Collagen forms the base for all connective tissue in the body. If you don't have enough vitamin C in your diet, you might get the disease scurvy. [Symptoms](#) include loss of appetite, bleeding gums, loose teeth, swollen ankles and tiny hemorrhages ([bleeding spots](#)) in the skin.

Procedure to test for vitamin C content. (With this method, you can compare relative vitamin C content and rank foods from highest to lowest, but you won't be able to get exact concentrations.)

You'll need some 2% iodine solution (find it at your local pharmacy) to prepare the vitamin C indicator solution described in steps 1 to 4.

1. Mix 1 tablespoon of cornstarch into enough water to make paste.
2. To this paste, add 250 milliliters of water and boil for 5 minutes.
3. Add 10 drops of the starch solution to 75 milliliters of water (use an eyedropper).
4. Add enough iodine to produce a dark purple-blue color. Now your indicator solution is ready.
5. Put 5 milliliters of indicator solution (about 1 teaspoon) in a 15-milliliter test tube (one for each sample).
6. To the test tube, use a clean eyedropper to add 10 drops of juice from the fruit or beverage (for solids, pulp them in a blender and strain the juice). Re-clean the eyedropper for each sample.
7. Hold the test tube against a white background. Line up the tubes from lightest to darkest purple. The lighter the solution, the higher the vitamin C content. That's because vitamin C causes the purple indicator solution to lose its color

2. Are there different amounts of iron in different breakfast cereals?

The iron in ready-to-eat [breakfast cereals](#) is in the form called elemental, not in combination with any other chemical compound. Iron is sprayed on the outside of [cereal flakes](#). You can separate the iron with a strong magnet.

Background Info: Iron is essential in a healthy [diet](#) to build blood. Iron is easiest to absorb from meat, fish and poultry.

Procedure:

You'll need a fairly sensitive scale for this procedure. A bathroom scale won't cut it!

1. Crush 1/2 cup of cereal in a baggie, until the flakes are half their original size. Pour into a bowl.
2. Add 1 cup of hot water and mix with a wooden spoon.
3. Get a strong, 3-inch bar magnet that is not grey or black (so the iron filings will show up). Don't use a horseshoe magnet.
4. Put the magnet into the cereal mix and stir gently in a circle for a fixed amount of

time, say 5 minutes. Try not to bump the bottom or sides of the bowl.
5. Take out the magnet. Remove the iron filings that it pulled from the cereal, and weigh them on a laboratory scale.

3. Are all apples equally sweet?

As apples ripen, the starch in the fruit changes to sugar, making the fruit sweet. What kind of sweet differences are there between apple varieties or individual apples of the same type?

Background Info: Starch levels in apples can be measured by dipping a portion of the apple into an iodine solution. The starch reacts with the iodine solution to produce a blue-black color in a pattern that is characteristic for each variety of apple. For example, Red Delicious apples lose starch in a fairly even ring, while Golden Delicious apples have an uneven pattern.

Recipe for the Iodine Solution:

Always make up a fresh iodine solution. Keep this solution in a dark-colored (or foil-wrapped) bottle and away from light. Since iodine is poisonous, treated apples should also be considered poisonous and should not be eaten by people or animals or used in composting. Do not allow pets to lick the fruit after testing.

Dissolve 10 grams (about 1/3 ounce) of potassium iodide in 10 ml (approximately 1/8 cup) of water. When it is dissolved, add 2.5 grams (about 1/12 ounce) of iodine crystals. Shake the mixture until the crystals are thoroughly dissolved. Dilute this mixture with water to make 1.14 liters (1 quart).

Make sure the solution is completely mixed by shaking the bottle everyday for several days.

Procedure:

1. It is best to test fresh apples that have not been stored, so this experiment is best done in the fall. Another way to use this test is to track apple ripening from a single tree over the harvest season to pinpoint the best time to harvest that tree's apples.
2. Pour the iodine solution into a shallow glass container to a depth of 5 to 7.5 mm (approx. 1/4 inch). Cut each apple in half horizontally across the core and put the exposed surface of one of the halves in the iodine solution. The apple stem can serve as a convenient handle, if the top half is used.
3. Wait 1 minute before removing the apple half. Repeat with the next test apple.
4. Compare the patterns of black spots, which indicate the presence of starch.
5. When there is no reaction and no color change, all of the starch has changed to sugar.

For comparison, you can find reference standards for starch iodine patterns for Macintosh, Red Delicious, Empire & Spartan (<http://www.omafra.gov.on.ca/english/crops/facts/00-027.htm#pics>), and Gala (<http://www.umass.edu/fruitadvisor/clements/articles/gala.jpg>) apple varieties on the Internet.

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