

# Fruit Juice Sleuth

Add drops of various popular single-serving juices to a starch and iodine solution to determine which contains the most Vitamin C. Hint: The results will be clear (and colorless).

## Question to investigate

Which juice contains Vitamin C?

## Chemistry content

- Vitamin C is naturally occurring in oranges but is not necessarily in drinks that are colored orange or have illustrations of oranges on them.
- Scientists conduct chemical tests to find out how much of different nutrients are in foods and drinks.

## Special considerations

- Make the iodine and starch solution ahead of time and away from children. Do not place betadine or other iodine containing first aid solution within reach of children. Use only the dilute solution in a properly labeled bottle ahead of time.
- Dispose of used dilute iodine solution, down the drain of a sink with plenty of water.
- Participants must wear splash goggles during this activity.
- Juices such as apple juice often have Vitamin C added as a preservative. It keeps the apples from turning brown for a light golden-colored juice!

<b>Time required</b>	<b>Age range</b>	<b>Group size</b>
Preparation 30 minutes Activity 8-10 minutes	4 – 10 years	<ul style="list-style-type: none"><li>• One participant per station</li><li>• 1 presenter per 2 stations</li><li>• 4 stations can fit along one edge of a 6- or 8-foot-long table to serve up to 24 participants per hour</li></ul>

## Materials

*For 4 stations operating continuously for one hour*

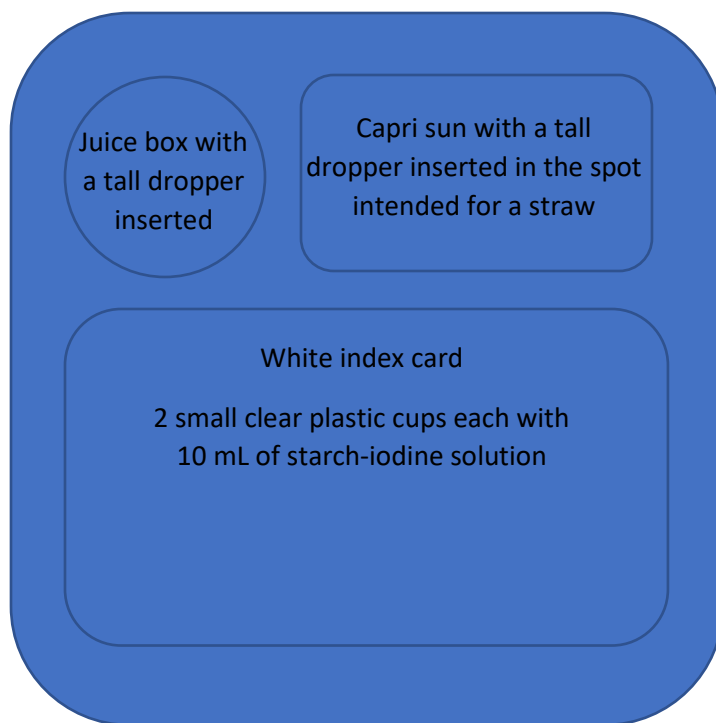
- Various fruit drinks with varying amounts of Vitamin C
  - Hi-C
  - Capri Sun
  - Orange Gatorade, optional
- Fresh oranges
- Fruit Fresh or Vitamin C powder
- 1 bag of potato starch
- 2 50 cc scoops
- 2 super small scoops
- 2 powder funnels
- 2 empty one-liter bottles, labeled “starch and iodine solution”
- 2 tall clear plastic cups
- 2 bottles of Betadine® antiseptic solution or other povidone-iodine solution, 10%
- 2 medicine cups
- 2 plastic bowls
- 4 small clear plastic cups
- 12 tall droppers
- Permanent marker
- 4 divided spill trays
- 4 large white index cards to serve as a white background for the testing area
- Paper towels
- Splash goggles
- Bucket for used liquids

## Prior to the activity

1. Use a knife and cutting board to cut 3 small oranges into 8 pieces. Rinse, dry, and put away the cutting board and knife.
2. Place the orange wedges into two plastic bowls.
3. Make the iodine-starch solution:
  - a. Half-filling 2 clean one-liter bottles with tap water.
  - b. Use a powder funnel to add 1 scoop (50 ccs) of potato starch to each bottle. Place the caps on tightly and shake both bottles vigorously.
  - c. Open the bottles and use a medicine cup to add 10 mL of betadine solution.
  - d. Fill the rest of the bottle with tap water.
4. Use a permanent marker to label the bottles and two tall clear plastic cups that will contain the starch and iodine solution.
5. Make a spout on the tall clear plastic cups by pinching the top of each cup.

**Prepare on site**

1. Then mark 5 mL on four other medicine cups. Each station will need a pair of cups.
2. Label clear plastic cups, "citric acid" solution. Place one dropper in each
3. Arrange four trays along the front of the table close to participants.
4. Place items on each tray as shown.



## Procedure

Onsite activity		
Step	Details	Ask participants
<b>Introduce Vitamin C</b>	<ul style="list-style-type: none"> <li>Explain that oranges and other citrus fruits contain Vitamin C. This is one of several vitamins that are important for your body to stay healthy.</li> <li>Food scientists conduct tests to find out which vitamins are in food. I'm going to show you how to test for Vitamin C. You will be able to tell which of these drinks contains the most vitamin C.</li> </ul>	<ul style="list-style-type: none"> <li>Do you like to eat oranges or drink orange juice?</li> </ul>
<b>Show what happens when Vitamin C powder is added to the iodine starch solution.</b>	<ul style="list-style-type: none"> <li>Use a medicine cup to measure and pour 10 mL of starch-iodine solution in two small clear plastic cups.</li> <li>Add 1 super small scoop of vitamin C powder to one of the cups of dark purple solution.</li> <li>Swirl the cup and compare this to the control.</li> <li>Explain that participants will know if a juice contains vitamin C because it will turn colorless. If it does not contain vitamin C, it will remain a dark purple color.</li> </ul>	<ul style="list-style-type: none"> <li>What do you notice about the color of the liquid in the cup?</li> <li>What color is the vitamin C powder?</li> </ul>
<b>Test drinks that look like they might contain orange juice to find out if they contain Vitamin C.</b>	<p><b>Direct participants to:</b></p> <ul style="list-style-type: none"> <li>Use a dropper to add single drops of Hi-C to one of the cups containing starch-iodine solution. Use a stirring rod to mix or swirl.</li> <li>Use a dropper to add single drops of Capri Sun to one of the cups containing starch-iodine solution. Use a stirring rod to mix or swirl.</li> </ul>	<ul style="list-style-type: none"> <li>Does the solution turn clear when you add Hi-C?</li> <li>Does the solution turn clear when you add Capri Sun?</li> <li>Which drink contains Vitamin C</li> </ul>
<b>Conclude with a prediction and a demo</b>	<ul style="list-style-type: none"> <li>Point to the control cup that you poured at the start of the activity.</li> <li>Ask participants to predict whether the liquid will turn colorless.</li> <li>Squirt the juice from an orange slice into the cup and swirl to mix.</li> </ul>	<ul style="list-style-type: none"> <li>Do you think the juice of this orange contains Vitamin C?</li> <li>How will you know whether it contains Vitamin C?</li> </ul>