





## Components

	NAME	DESCRIPTION	AUDIENCE
	<i>Separation techniques</i> teachers guide	This guide shows how this resource can be used to elaborate on the concepts of solutions and separation techniques. Students observe how nutrients can be extracted and added to soft drink, then investigate the vitamin C content of fruits.	teachers
	<i>Wild juice</i> video	This video shows a research scientist at The University of Western Australia extracting nutrients from Kakadu plums. Various extraction techniques are used during the process.	students
	<i>Which fruit has the most vitamin C?</i> procedure sheet	This procedure sheet describes a scientific investigation to find out which fruit contains the most vitamin C. Students make use of various extraction methods.	students
	<i>Investigation scaffold</i> worksheet	This scaffold may be used to help students plan an investigation into the vitamin C content of various fruits.	students

## Purpose

To **Elaborate** on concepts and apply students' knowledge of separation techniques to the extraction and use of nutrients from fruit.

## Outcomes

Students:

- understand that separation techniques are used in real life situations to extract and identify useful chemicals,
- plan for and use extraction, and qualitative testing techniques in an investigation.

## Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students watch the video, <i>Wild juice</i> .	whole class
Teacher demonstrates how to test a substance for vitamin C. This procedure is outlined on the procedure sheet, <i>Which fruit has the most vitamin C?</i>	teacher demonstration
Students perform a scientific investigation to extract and measure vitamin C content using the procedure sheet, <i>Which fruit has the most vitamin C?</i>  The worksheet, <i>Investigation scaffold</i> , may be used to guide students plan and carry out their investigation.	small groups, then individuals

## Technical requirements

The teachers guide, procedure sheet and worksheet require Adobe Reader (version 5 or later), which is a free download from [www.adobe.com](http://www.adobe.com). The procedure sheet and worksheet are also available in Microsoft Word format.

QuickTime version 7 or later is required to view the video. This is a free download from [www.apple.com/quicktime](http://www.apple.com/quicktime). A high quality MP4 version is available on CD-ROM or download from the SPICE website.

 The video contains closed captions.

## Acknowledgements

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Designed and developed by the Centre for Learning Technology, The University of Western Australia.  
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## Teacher notes

### Using the video

The video may be used as stimulus, for discussion of separation techniques, by addressing the following questions:

- Which techniques shown in the video are similar to ones you have used?
- Which techniques are particularly useful for 'no-heating' separation of nutrients?
- What is meant by the term 'sublimation'?
- What do you think of the idea of using native plants for food additives?

### Performing investigations

If students have not completed an open investigation before, the class could work together to perform an investigation to find which type of drink (eg juices, cordials or soft drinks) contains the most vitamin C, before undertaking the main investigation. This would provide the teacher with an opportunity to scaffold the investigation method for students.

### Testing for vitamin C

A cornstarch/iodine solution needs to be prepared by the teacher in advance. Alternately, more advanced students could make their own indicator using this method, if time permits.

### Equipment required

- 2 tablespoons of starch (cornstarch or cornflour, available at supermarket)
- iodine solution (tincture of iodine, available at chemist)
- 500 mL beaker
- water
- tablespoon
- stirring rod

### Method

- Add cornstarch to 500 mL water, stir then filter until clear liquid (it may be necessary to filter it twice).
- Add tincture of iodine, a drop at a time, until solution turns dark blue (it goes brown if too much is added). This quantity is enough for a whole class.

### Student investigation tips

Students should create their own procedure to extract vitamin C before testing, but the teacher may like to give some of the following hints:

- Some fruits (particularly harder fruits, like apple) may need to be mixed with water before attempting an extraction but be careful to test fairly. If water is added to one fruit, how can the test be made fair?
- It is useful to chop fruit to extract vitamin C but be careful to test quickly after chopping or mashing as vitamin C is affected by oxygen.
- Vitamin C content is affected by heat.
- It may be helpful to leave fruits to soak in water overnight.
- There should be no solid bits in liquids that are tested.

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Web: [spice.wa.edu.au](http://spice.wa.edu.au)  
Email: [spice@uwa.edu.au](mailto:spice@uwa.edu.au)  
Phone: (08) 6488 3917

Centre for Learning Technology (M016)  
The University of Western Australia  
35 Stirling Highway  
Crawley WA 6009

## Associated SPICE resources

*Soft drink science 6: Separation techniques* may be used in conjunction with related SPICE resources.

DESCRIPTION	LEARNING PURPOSE
<p><i>Soft drink science (overview)</i></p> <p>This learning pathway shows how a number of SPICE resources can be combined to assist with teaching the topic of states of matter and solutions.</p>	
<p><i>Soft drink science 1: Soft drink fountain</i></p> <p>A teacher demonstration engages students' interest in the three states of matter, solutions and separating techniques.</p>	<b>Engage</b>
<p><i>Soft drink science 2: Investigating soft drink</i></p> <p>Students separate and investigate the components of soft drink through practical activities.</p>	<b>Explore</b>
<p><i>Soft drink science 3: States of matter</i></p> <p>Students use worksheets and an interactive learning object to construct an explanation of the particle model of matter.</p>	<b>Explain</b>
<p><i>Soft drink science 4: Making soft drink</i></p> <p>Students investigate solutions and use their knowledge to make a soft drink.</p>	<b>Explore</b>
<p><i>Soft drink science 5: Solutions</i></p> <p>Students use worksheets and an interactive learning object to construct an explanation of separation techniques, using the particle model of matter.</p>	<b>Explain</b>
<p><i>Soft drink science 6: Separation techniques</i></p> <p>A video about a forensic food scientist illustrates the importance of different separation techniques. Students perform their own practical investigation that involves separation techniques.</p>	<b>Elaborate</b>