

INVESTIGATING FRUITS AND VEGETABLES

Aim

Finding out the most successful method/s for preventing or delaying enzymic browning.

(Note: this experiment can be adapted by reducing or changing the fruits and vegetables used.)

Equipment

- Selection of small bowls or basins (plastic cups are ideal)
- White trays
- Green chopping board
- Chef's knife
- Sticky labels and marker pen
- Measuring jug
- Lemon juicer
- Digital timer / stopwatch / clock
- Camera

Ingredients

- Selection of fruits and vegetables known to go brown when cut. For example, apple, banana, pear, avocado, aubergine, potato.
- 10g caster sugar
- 10g salt
- 2 lemons (approx. 30ml of juice is needed)
- Cold tap water

Method

- Read the instructions from start to finish.
- Label the bowls/basins clearly, so that you can identify which sample is which (see the variations below).
- Slice the food samples thinly and conduct the samples as follows (Note: you should select fruits and vegetables that are easily available.)
- **Control** – leave the sliced fruit/vegetable open to the air (no water or additional ingredients should be used).
- **Variation 1** – pour cold water (no additions) directly over the sliced samples, and make sure each sample is covered.
- **Variation 2** – add 10g sugar to 500ml cold water. Stir to make sure the sugar has dissolved, and then pour the solution directly over the sliced samples so that each sample is covered.
- **Variation 3** – add 10g salt to 500ml cold water. Stir to make sure the salt has dissolved, and then pour the solution directly over the sliced samples so that each sample is covered.
- **Variation 4** – add 10ml lemon juice to 500ml cold water. Stir to make sure it is well mixed, and then pour the solution directly over the sliced samples so that each sample is covered.
- **Variation 5** – add lemon juice directly to the sliced fruit/vegetable (no water should be used). Make sure the sample is well covered in lemon juice. Dunking each sample in lemon juice is a quick way of doing this.
- Photograph the samples at the beginning of the experiment, and at regular time intervals, so that you can see if the samples change colour.
- Leave the samples on the work surface, uncovered and at room temperature, for 30 minutes. Observe the colour changes, if any have taken place.
- Continue to record the colour changes after 1 hour and then regularly each hour, for as long as you can.
- Complete the results table below.

Results

	Immediately after cutting	30 minutes after cutting	1 hour after cutting	3 hours after cutting	5 hours after cutting	20 hours after cutting
Control						
Variation 1						
Variation 2						
Variation 3						
Variation 4						
Variation 5						

Conclusions

Summarise your findings here. You should consider:
Which method delayed enzymic browning the most?

What, in your opinion, is the most effective method of preventing/delaying enzymic browning to the least effective method? Rank them in order.




Most effective method
Least effective method

Explain the reactions that are taking place between the fruit/vegetable and the method used.

Control	
Variation 1 – cold water (no additions)	
Variation 2 – sugar water	
Variation 3 – salt water	
Variation 4 – lemon juice water	
Variation 5 – lemon juice (no water)	

Are particular fruits or vegetables prone to browning more than others? Rank them in order of susceptibility to browning.



Fruit/vegetable which has browned the most
Fruit/vegetable which has browned the least

What practical advice would you give to a cook preparing fruits or vegetables which are prone to browning?

Which is the best method for avoiding enzymic browning?

What advice would you give to a cook who is making a fruit salad containing apples and pears in order to prevent, or at least delay the rate at which enzymic browning occurs?

Extension task

Develop the above experiment by also blanching samples. How will this affect your results? Give practical suggestions as to how blanching might be useful when preparing fruits and vegetables which are prone to browning.

Select a range of different varieties of one particular fruit (for example, apples – Braeburn, Bramley, Cox, Gala, Pink Lady), or one particular vegetable (for example, potatoes – Cara, Desiree, Estima, King Edwards, Maris Piper). See if certain varieties of your chosen fruit or vegetable are more or less likely to brown. Think about how this knowledge may help you when cooking dishes with your selected fruit or vegetable.

Finely chop or purée a selection of fruits and vegetables. What effect does this have on enzymic browning?

Consider freezing samples over different time periods – for example, 1 week, 1 month, 3 months, 6 months, etc. Compare the colour of your samples over the time period. What changes can you see? Can you suggest how long these samples should be kept to ensure they are acceptable to eat?