

Blanching: what is the most effective method?

Time

1–2 h.

Curriculum links

Enzymes, catalysts.

Group size

2– 4.

Materials and equipment

Materials per group

- 1 kg of Brussels sprouts
- 0.5% v/v hydrogen peroxide solution (No significant hazard at this concentration)
- 1% guaiacol solution (solid is harmful if swallowed and a skin/eye irritant. Solution at this concentration is a low hazard)
- access to deionised water.

Equipment per group

- teat pipettes
- large beakers
- Bunsen burner
- sieve
- knife
- access to balance
- items from junk list to make grading device
- safety glasses.

Safety

If preparing the solutions, eye protection must be worn. For simply carrying out the investigation there are no significant hazards.

Risk assessment

A risk assessment must be carried out for this activity.

This is an open-ended problem solving activity, so the guidance given here is necessarily incomplete. Teachers need to be particularly vigilant, and a higher degree of supervision is needed than in activities which have more closed outcomes. Students must be encouraged to take a responsible attitude towards safety, both their own and that of others. In planning an activity students should always include safety as a factor to be considered. Plans should be checked by the teacher before implementing them.

You must always comply with your employer's procedures and in some cases may decide that a particular activity is inappropriate in your situation. Further information on Health and Safety should be obtained from reputable sources such as CLEAPSS [<http://science.cleapss.org.uk/>] in England, Wales and Northern Ireland and, in Scotland, SSERC [<https://www.sserc.org.uk/>].out for this activity.

Commentary

This problem mirrors the process that is used in the food industry. Students should realise that the first task is to sort the sprouts into grades, three are sufficient. During trialling two square holes were used for the grading: 18 mm and 22 mm. Sprouts passing through the small hole were graded as small, while those that did not pass through the 22 mm hole were large; the remainder were medium. The sprouts should be blanched in boiling water and it should be kept boiling during the blanching. Trialling showed that approximately 5 minutes is required although the time depends on size, and the same water can be used repeatedly for the blanching. However it is important that a fresh water cooling solution is used each time. Cooling should take around 5 minutes.

Adding 3 drops of each of the hydrogen peroxide and guaiacol solution to cut sprouts should give an immediate result. If a brown colour appears within 10 s then this is a positive test for peroxidase activity. If colour appears only after 10 s or does not appear then this is a negative result. During trialling it was noted that a rapid colour change indicated severe underblanching, a slower colour change may indicate that blanching is about right, while a lack of any colour change after several minutes may indicate overblanching. Students who have difficulty with the test should try it out on unblanched sprouts first.

Extension

This problem has been set as a competition. Students were asked to estimate the relative cost of blanching each fraction size; to plot blanching time against size; and to suggest what other vegetables could be used.

Broccoli and carrots can be used as alternative vegetables, and these do not need grading. They must, however, be cut up into uniform sized pieces. Mange-tout (or sugar-snap peas) can also be used, but need to be ground together with calcium carbonate and test for an alternative enzyme, catalase.

Acknowledgement

This activity is based on an exercise used at a regional heat for 'Top of the Bench' competition. The Society is grateful to Chris Harbord of Birds Eye Walls for his advice.

Credits

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Health & safety checked May 2018

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