Food test: Enzymatic browning

**Objective**

To investigate the effectiveness of different chemical agents to prevent enzymatic browning

**Principles**

When fruits or vegetables are peeled or cut, the plant tissue releases some enzymes which in the presence of oxygen from the air, chemically react with plant compounds to give brown pigments. This reaction is known as enzymatic browning. The reaction makes the food unappealing and limits the shelf life of many fruits and vegetables. The reaction can be prevented by the use of chemical agents.

**Equipment & materials**

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| **Equipment** | **Materials** |
| 6 small bowls/ beakers  Small plates  Paring knife  Cutting board  Electronic weigh scale  Timer  Paper towel | Assigned fruit or vegetable (e.g. apple, banana, potato, turnip)  60ml water  60ml lemon juice  60ml vinegar  60ml sugar syrup (dissolve 25g sugar in 60ml water)  60ml brine (dissolve 13g salt in 60ml water) |

**Procedures**

1. Label six small bowls/ beakers as follows: no treatment (control), water, lemon juice, vinegar, sugar syrup, and brine.
2. Fill each beaker bowl with 60ml of the appropriate solution.
3. Cut the fruit or vegetables into 12 pieces of equal size.
4. Immerse two fruit slices into each solution so they are completely covered. Let the samples soak for 5, 10, 20 and 60 minutes.
5. Remove the fruit from the solutions and place them on the appropriate plate. Pat dry fruit slices with paper towel.
6. Note the intensity of browning on the surface of each sample after 5, 10, 20 and 60 minutes. Record the intensity by the number of “+”. (max 10 “+”)

**Results**

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| --- | --- | --- | --- | --- | --- |
| **Sample** | **Treatment** | **5mins** | **10mins** | **20mins** | **60mins** |
| 1 | No treatment |  |  |  |  |
| 2 | Water |  |  |  |  |
| 3 | Lemon juice |  |  |  |  |
| 4 | Vinegar |  |  |  |  |
| 5 | Sugar syrup |  |  |  |  |
| 6 | Brine |  |  |  |  |

**Questions**

1. Compare your results with other groups which use different fruits/vegetables. What kinds of fruits/ vegetables are more susceptible to enzymatic browning?
2. Which solution worked the best for preventing enzymatic browning?
3. How can each of these solutions be used in food preparation?