Learning activity 4

Effects of heat transfer on the texture of potato

**Objective**

To investigate the effects of heat transfer on the texture of potato.

**Principle**

Conduction and convection are the two methods commonly used in cooking. When boiling a potato, heat is transferred from the cooker to the cooking utensil (solid), the cooking utensil will heat up water (liquid) inside it, and lastly heat will be transferred to molecules in the potato. When baking a potato, the heat from the convection oven begins to heat up, the heated air will cause the surface of the potato to be heated. Heat will then penetrate to the potato’s water molecules and moves to the center of the potato.

In both cases, heat is transferred by convection and conduction. When water conducts heat, it is more efficient than air, therefore there is a difference in cooking time.

**Equipment & materials**

|  |  |
| --- | --- |
| **Equipment** | **Materials** |
| Scale  Saucepan  Baking tray  Aluminium foil  Timer  Chopstick/skewer  Knife | Russet Potato (similar weight and shape) 4 |

**Procedure**

1. Pre-heat oven to 180oC.
2. Bring water to the boil.
3. Wash and clean potatoes.
4. Cook two potatoes in water, and another two in the oven on a baking tray lined with aluminium foil.
5. Cook the potatoes for 40 minutes.
6. Take out one potato from boiling water and the other one from the oven. Cook the remaining potatoes for another 20 minutes.
7. Cut the cooked potatoes into halves and observe the cross section of each.
8. Use a chopstick or skewer to test for the internal texture of potatoes.
9. Compare results.

**Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample** | **After cooking for 40 minutes** | | **After cooking for 60 minutes** | | **Other observations** |
| **Shape** | **Tenderness** | **Shape** | **Tenderness** |
| Boiled potato |  |  |  |  |  |
| Baked potato |  |  |  |  |  |

**Questions**

1. Name all the conductors in the boiling of potatoes.
2. In a convection oven, what can be done to speed up the cooking process?

**Answers**

1. Saucepan, boiling water, water molecules inside of potato
2. Turn on fan to cause forced convection