**3.01 Effect of Water on Food Quality and Measuring Water Content**

**Background**

Aside from crackers and those foods that naturally make you thirsty or reach for the closest glass of water, most natural foods are comprised of at least 70% water. This presence impacts the foods quality, shelf life, texture, and ultimately flavor. Plants, where many natural foods are derived, store their water in the parts of the food that people eat. Fruits are filled with water to carry and nourish the seeds while roots act as storage vessels and anchoring devices and stems support the leaves and fruiting structures.

The chemical and physical properties of water determines the properties of raw foods and the nature of the changes that take place during food processing and preparation. Water is an unusual compound with unique qualities and characteristics.

Fungi, which is neither a plant nor animal and rather in a classification of its own, contains water and other compounds that make up that fruiting body that is used as an ingredient or stand-alone dish in cuisine all over the world. Exploring how water impacts this organism and ultimately this food commodity will be explored in the following two activities.

**Effect of Water on Food Quality**

**Equipment Needed:** paper towels and three plates.

**Supplies Needed:** one container of pre-sliced mushrooms and one container of whole mushrooms (must be the same variety- cremini, portabella, button, etc.).

**Procedure**

1. Slice whole mushrooms to the same thickness of those that are pre-sliced.
2. Place half of the pre-sliced container on a plate and label these. Place half of the newly sliced mushrooms on another plate and label accordingly. Place the remaining whole mushrooms on a plate and label accordingly. Be sure to spread the mushrooms out so that they are not overlapping or touching.
3. Allow the produce to dry at room temperature for 3 days or until all of the mushrooms feel dry and pliable to the touch.
4. Display the foods and record your findings on the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Mushroom Type | Day 1 Observations | Day 2 | Day 3 |
| Pre-sliced |  |  |  |
| Sliced (once was whole) |  |  |  |
| Whole |  |  |  |

**Analysis**

1. What was the effect of water on the quality of the mushrooms?
2. Which type of mushroom suffered the greatest loss of quality?
3. Why do you think this was the case?
4. Which mushroom would you eat if you had to choose one? Why?
5. What role do you think water plays in shelf life of mushrooms?
6. How important is the effect of water on food quality to mushroom growers, grocers and food manufacturers?

**Measuring Water Content**

**Equipment Needed per Group:** Electronic balance, oven, baking sheet, cooling rack, cutting board, chef’s knife

**Supplies Needed Per Group:** ½ a container of one of the following whole or pre-sliced mushrooms (all groups should have the same variety).

**Procedure**

1. Groups should be given one of the following variables:
   1. Whole mushrooms
   2. Pre-sliced mushrooms
   3. Whole mushrooms sliced to the thickness of pre-sliced mushrooms
   4. Be sure that you slice mushrooms evenly
2. Using gram weight, weight the mushrooms using an electronic balance. Count the number of slices or whole mushrooms. Take the overall weight and divide by this number to determine thhe average weight of each item (whole or slice).
3. Place a cooling rack on a baking sheet and place the mushrooms (spread out, not overlapping or touching) on top of the cooling rack. Place the baking sheet (topped with the cooling rack and mushrooms) in the oven over night at 180F. The samples should be dry and crisp, like a cracker (not burnt).
   1. You can also use a food dehydrator for this activity.
   2. Just place the mushrooms on the dehydrator’s racks and be sure that they do not touch or overlap.
4. Weight the dried samples just as you did in step 2. Determine the average weight of each mushroom (slice or whole).
5. To determine water content for the sample, subtract the average dried weight from the average un-dried weight.
6. To calculate the percentage of water content, divide the dried weight sample averages by the undried weight sample averages.
7. Share your data with the class.

**Data Table**

|  |  |  |
| --- | --- | --- |
| Water content in mushrooms | Water content (grams) | Water content (%) |
| Pre-sliced |  |  |
| Sliced (originally whole) |  |  |
| Whole |  |  |

**Analysis**

1. Why is accuracy in measuring so vital to scientific study in food technology?
2. How does the water content of foods affect the quality of the food?
3. Which sample had the greatest water loss? Explain.
4. Which sample had the least water loss? Explain.
5. What is the actual water content for the type of mushroom that you have according
6. Does your data mirror these results?
7. If not, what do you think went wrong with your mushroom data?
8. Do you think that you could rehydrate a mushroom once it is dried? Explain.

**Extension Activity**

1. Place your dried, sliced or whole mushrooms in water over night.
2. Reweigh your samples and see how much water they reabsorbed.
3. What is the water content percentage now?
4. How does this activity relate to the field of food science?