

Unit

1

Handout

24

## Lesson 5: Osmosis in Carrots

**Purpose:** To observe how osmosis affects plants.

### Research/Background:

Osmosis is the diffusion of water particles from a higher concentration to a lower concentration. An easy way to observe this is by using plants. Plant shape and firmness can change based on how much water is in the plant. You have seen this before when a plant wilts. It wilts because it does not have enough water to keep itself upright. In this lab, we will place carrots in a solution that contains a concentration of water higher or less than the concentration of water in the carrot.

### Procedure

1. Label the end of two ribbons with your period number. Label one SALT and one FRESH.
2. Use the ribbon and the ribbon to determine the circumference of the carrot.
3. Tie the ribbon as tightly as you can around the carrot without damaging the carrot.
4. Make observations about the ribbon and the carrot in the table below. We will collect the class mass together.
5. Give the carrots to Mr. Ower for the class measurement.
6. Re-collect this data after 24 hours.

Observations of Fresh Water Carrot at 0 Hours	Observations of Saltwater Carrot at 0 Hours
Circumference: _____	Circumference: _____
Class Mass: _____ My Mass: _____	Class Mass: _____ My Mass: _____
Qualitative Descriptions:	Qualitative Descriptions:

Observations of Fresh Water Carrot after 24 Hours	Observations of Saltwater Carrot after 24 Hours
Circumference: _____	Circumference: _____
Class Mass: _____ My Mass: _____	Class Mass: _____ My Mass: _____
Qualitative Descriptions:	Qualitative Descriptions:

Answers will vary. The starting mass and circumference will be lower than the ending mass and circumference for the freshwater carrots.

Answers will vary. The starting mass and circumference will be higher than the ending mass and circumference for the saltwater carrots.

**Analysis****FRESH WATER CARROT DATA ONLY!**

1. Did the mass of the carrots change after 24 hours? How? Yes, it increased.
2. Did the carrot (overall) shrink or grow? It grew
3. Was the carrot placed in a hypertonic or hypotonic solution? Hypotonic
4. Which had a higher concentration of water: the solution or the carrot? Solution
5. Where did the water move from and to? From the solution and to the carrot
6. How did the carrot change after sitting in the fresh water solutions for 24 hours?

*The volume of the carrot increased and the mass increased from \_\_\_g to \_\_\_g.  
Replace the missing values with your own data!*

7. In one or two complete and detailed sentences, describe what happened that caused the fresh water carrot to change. Your answer should include the following words: osmosis, water, mass, concentration, and solution.

*The mass and size of the carrot increased due to the osmosis of water into the carrot. This happened because there was a higher concentration of water in the solution and a lower concentration of water in the carrot. The water moved from the solution and into the carrot causing the observed changes.*

**SALTWATER CARROT DATA ONLY!**

8. Did the mass of the carrots change after 24 hours? How? Yes, it decreased.
9. Did the carrot (overall) shrink or grow? It shrank
10. Was the carrot placed in a hypertonic or hypotonic solution? Hypertonic
11. Which had a higher concentration of water: the solution or the carrot? Carrot
12. Where did the water move from and to? From the carrot and into the solution
13. How did the carrot change after sitting in the salt water solutions for 24 hours?

*The volume of the carrot decreased and the mass decreased from \_\_\_g to \_\_\_g.  
Replace the missing values with your own data!*

14. In one or two complete and detailed sentences, describe what happened that caused the salt water carrot to change. Your answer should include the following words: osmosis, water, mass, concentration, and solution.

*The carrot's mass and volume decreased because water left the carrot due to osmosis. The carrot had a higher concentration of water than the solution. Therefore the water left the carrot and went into the solution causing the observed changes.*