

Osmosis in Red Onion Cells

Background:

Name _____

All cells have a cell membrane which is described as being “Selectively Permeable”. This means that some materials can move easily in or out of the cell through the cell membrane as though it were a screen. When a substance passes through the membrane without any help from the cell, it’s most likely caused by diffusion. Water is a substance that can do this. When water diffuses into or out of a cell it is called “OSMOSIS”. Since cells have water in them and basically live in a water-based environment, osmosis is always possible.

When does this happen? If we understand diffusion, it’s not hard. We would think about where is water more highly concentrated (more pure): inside of the cell or outside? This is relative and depends on the environment the cell is in. Three possibilities exist:

1. If the cell’s external environment becomes very WATERY (dilute) then the *outside* of the cell will have a higher water concentration. We say the cell environment is HYPOTONIC. Water will diffuse in this case. Which way is the water going to diffuse? _____
2. If the cell’s external environment becomes very SALTY then the *inside* of the cell will have a higher water concentration. We say the cell environment is HYPERTONIC. Water will diffuse in this case. Which way is the water going to diffuse? _____
3. If the cell’s external environment keeps the same level of water concentration as the inside of the cell, we say the cell environment is ISOTONIC. There will be no net loss or gain of water into or out of the cell.

Purpose:

The purpose of this lab is to examine a plant cell’s response to a change in the cells’ water environment.

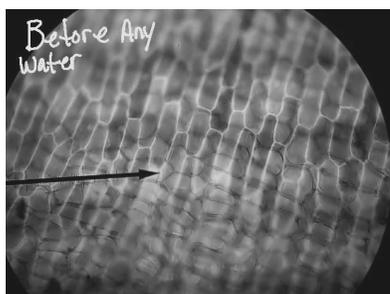
Materials:

Red onion, microscope, microscope slide, cover slip, 15% Sodium Chloride solution, bottle of distilled water, colored pencils, paring knife, dish of tap water

Procedure: PHASE 1 / NORMAL CELLS / DRY MOUNT

1. Carefully slice away the colored layer of cells from the red onion. This should only be the THIN PURPLE LAYER.
2. Place the thin, purple onion layer on a dry microscope slide SHINNY SIDE UP– DO NOT PUT ON WATER OR COVER SLIP YET
3. Scan the ENTIRE onion tissue on LOW POWER to find and center the MOST PURPLE area and focus. Set the microscope to MEDIUM power and focus the view.

Given that the space below represents ONE CELL, color it in using a colored pencil to show how ONE cell looks normally.



The image left is similar to the entire field of view having many cells that you should be seeing at MEDIUM POWER.

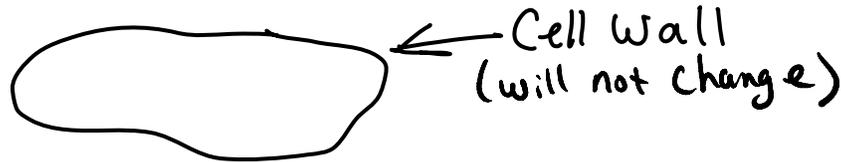
This represents ONE CELL:



PHASE 2 / SALT WATER ENVIRONMENT / WET MOUNT

4. Now that you have observed the layer of normal cells which are the subject of this lab, make a wet mount using 2 or 3 drops of SALT WATER solution on the onion tissue then install cover slip.
5. Watch the cells for approximately 2-3 minutes or longer as you again survey the ENTIRE onion tissue on LOW POWER. You should see changes within many of the cells initially near the perimeter of the onion tissue. As time passes all or most of the cells should become affected by the salt water. Find some cells that have noticeably been affected and observe them under MEDIUM power.

Given that the space below represents ONE CELL, color it in using a colored pencil to show how ONE cell now looks different within its cell wall.

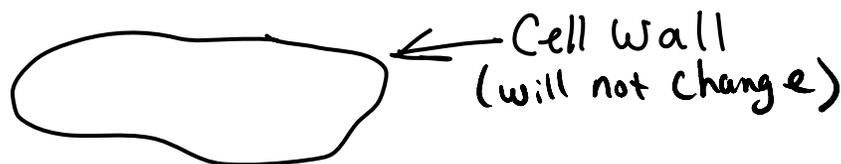


Your description of what has happened (go to the background paragraphs for help):

PHASE 3 / PURE WATER ENVIRONMENT (DISTILLED WATER) / WET MOUNT

6. After you have colored the diagram correctly above, you need to prepare for phase 3 of this lab by putting the entire salt water wet mount in the dish of tap water to *rinse off* the salt water from the slide, cover slip AND onion tissue layer. Dry the slide and coverslip then gently dab the onion tissue dry.
7. Make a wet mount of the onion tissue you just rinsed using 2 or 3 drops of DISTILLED WATER on the onion tissue then install cover slip. Watch the cells for approximately 2-3 minutes or longer as you again survey the ENTIRE onion tissue on LOW POWER. You should see changes within many of the cells initially near the perimeter of the onion tissue. As time passes all or most of the cells should become affected by the distilled water. Find some cells that have noticeably been affected by the distilled water and observe them under MEDIUM power.

Given that the space below represents ONE CELL, color it in using a colored pencil to show how ONE cell now looks different within its cell wall.



Your description of what has happened (go to the background paragraphs for help):

Questions:

1. When the salt solution was added to the onion cells, where was the greater concentration (most pure) of *water*? (inside or outside the cell membrane).
How do you know this? Explain:
2. In the winter, grass often dies near the roads that have been covered in salt to remove the ice. Using what you have learned in this experiment, what do you think is the reason the grass dies?

RETURN TO TEACHER WITH COMPLETED LAB SHEET

POST-LAB RESOURCE / LAB COMPLETION OUTSIDE OF SCHOOL RESOURCE

