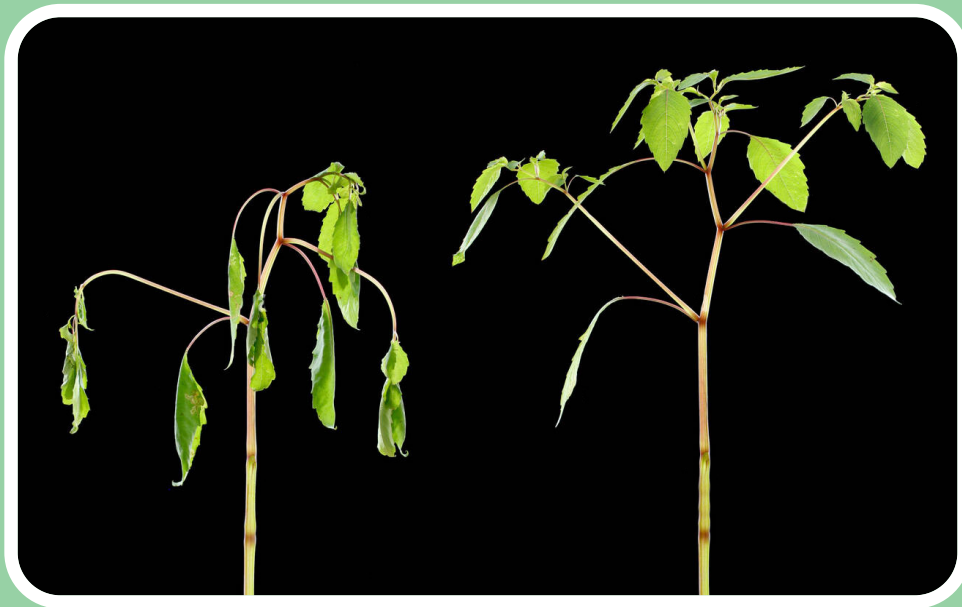


Diffusion of Water



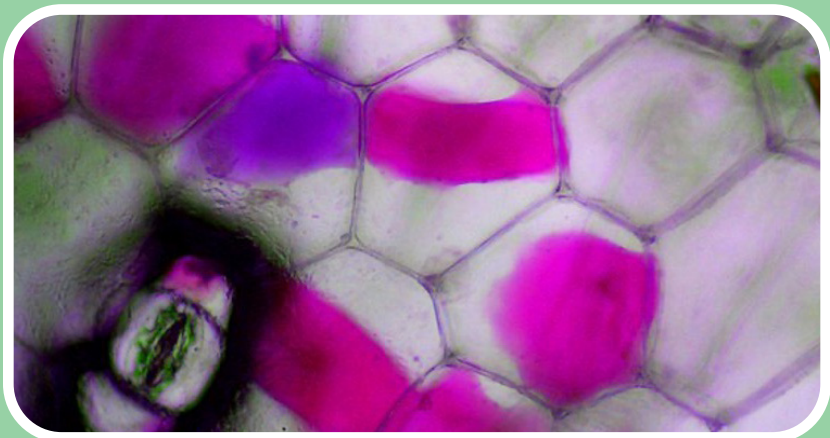
Diffusion of Water

Do you need an idea for a scientific study?

Try out one of our ideas or make one of your own.

Plasmolysis is the process in which a cell loses water from inside the cell and the plasma membrane pulls away from the cell wall. Take the following brief quiz to see how much you already know about plasmolysis. See the bottom of page 4 to check your answers.

1. All osmosis is a diffusion process, but not all diffusion is an osmotic process.
 - a. True
 - b. False
2. Plasmolysis always results in the death of a plant cell.
 - a. True
 - b. False
3. Plasmolysis is used to cure meats to prevent spoilage due to the increase in numbers of harmful bacteria present in the meat.
 - a. True
 - b. False
4. The production of modern red wines relies on a process that enhances the plasmolysis of the cells of the grapes.
 - a. True
 - b. False
5. Who is credited for “discovering” the causes of the changes of plants cells associated with the plasmolysis process?
 - a. Jonas Salk
 - b. Alexander Fleming
 - c. Hugo de Vries
 - d. Robert Hooke



Saving Your Potatoes

Quite often after slicing a potato, if left too long before eating the potato turns brown and appears unappetizing. Exposure to air causes a chemical reaction called oxidation that changes the starch in the potato to a gray, brown, or even black color. Is there a way to slow down this process? Get started now saving your potatoes.

Materials

2 – baking potatoes
knife
2 – tablespoons of table salt

2 – large drinking glasses
distilled or purified water
masking tape

Procedure

1. Make sure to secure permission before conducting this investigation.
2. Do *not* eat or drink any of the materials used in this investigation.
3. Label one drinking glass as “Distilled Water” and the other glass as “Salt Water.”
4. Carefully cut each of the potatoes vertically into long strips like french fries.
5. Observe and record in Table 1 the appearance of the potato strips.
6. Fill the “Distilled Water” drinking glass about $\frac{3}{4}$ with distilled water.
7. Fill the “Salt Water” drinking glass about $\frac{3}{4}$ with distilled water and then stir in the tablespoons of table salt into this glass.
8. Place one group of potato strips in each glass.
9. Let the potato strips soak overnight.
10. Remove, observe, and record in Table 1 the potato strips’ appearance.
11. Dispose of the potato strips and water from the glasses using appropriate means.

Table 1. Appearance of Potato Strips

Container	Observations Before Soaking	Observations After Soaking
Distilled Water		
Salt Water		

Questions

1. Construct an explanation for the results of this investigation.
2. Describe how the results of this investigation would or would not be different if the potatoes were peeled instead of being sliced.

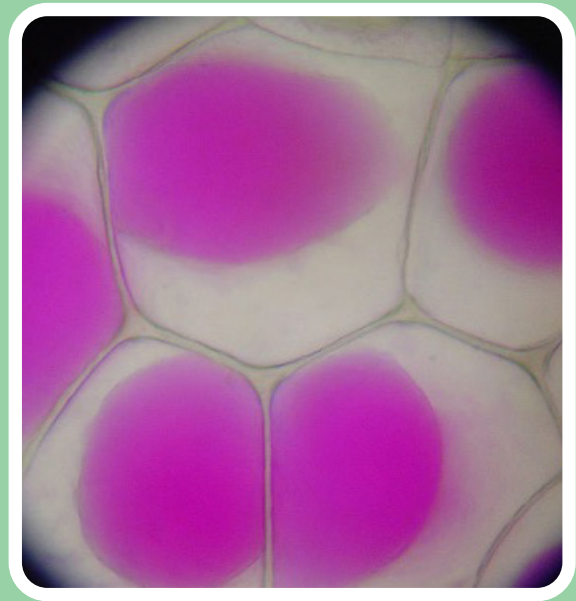
Diffusion of Water

Types of Plasmolysis

Plasmolysis is a process associated with a plant cell losing water when placed in a hypertonic solution. Since a hypertonic solution has a higher concentration of solute than the plant cell, water will leave the plant cell moving from a higher concentration of water inside the cell to a relatively lower concentration of water outside the cell in the hypertonic solution. As the cell loses water, the size of the cell shrinks. This osmotic process does not require the input of additional energy, so the process can quickly become out of control and lead to the death of the plant cell.

Both internal and external factors can influence the degree of damage experienced by plasmolyzed cells. A plants age and the stage of development of the plant along with cell wall pore size and how the cell wall is attached can all affect the likelihood of damage due to plasmolysis.

There are two major types of plasmolysis: concave and convex plasmolysis. In concave plasmolysis a portion of the plasma membrane and protoplasm detach from the cell wall. This detachment forms a half-moon shape. Placing the cell in a hypotonic solution can reverse this type of plasmolysis and revitalize the plant cell.



Convex plasmolysis is not a reversible process. When the amount of water loss becomes excessive, the plasma membrane and protoplasm completely detach from the cell wall. The cell wall eventually ruptures causing the death of the cell. Even placing the cell in a water-rich environment will not bring the cell back to previously functioning level. A common case of convex plasmolysis can be seen when a plant wilts and dies from lack of water.

**Please visit our site for more helpful information:
STEMsims.com**

Answers: Page 2 Answers: (1) a, (2) b, (3) a, (4) a, (5) c. **Page 3 Answers:** (1) Being under water protected the potatoes from air and slowed the oxidation reaction. The potatoes in the salt water underwent plasmolysis and the water was removed from the cells turning them brown. (2) Answers will vary. The results would have been similar.

© 2022 STEM Sims. All rights reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable, and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent or other industrial or intellectual property rights.