

Classroom Activity – Plasmolysis, osmosis, and diffusion

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This activity will serve several roles: it will allow students to observe and understand osmosis, diffusion, and dehydration/plasmolysis in addition to how these processes impact cells.

Note: several materials are needed for this full activity including computers so the students can complete the computer model. For the wet-mount procedure slides, coverslips, elodea or other plant leaves, and a microscope are necessary. **Always urge students to be careful with glass and the microscopes!**

Lesson plan:

- 1) Begin with an introduction to osmosis and diffusion, starting with movement of diffused molecules (solvent and solutes). It is important to clearly define diffusion and osmosis. These are very important and advanced concepts. Show several pictures/models of the movement of molecules from high to low concentration due to diffusion/osmosis. It is critical to emphasize that these two processes are similar, but not the same. Highlight the differences, and encourage questions.
- 2) Show a representative cell with water and dissolved solutes with an imbalance of molecules inside and outside the cell. Get students to predict the movement of solutes and water into/out of this cell based on the definitions of diffusion/osmosis.
- 3) Based on the movement of water, explain that the cell membrane will shrink or expand in response. This is a consequence of the level of the cell's hydration/dehydration.
- 4) Students will use the plasmolysis model simulation on a computer. Ask them to change the initial water content of the cell and document their observation of how that affects the size of the cell membrane, as compared to the size of the cell wall. Have the students progressively add salt, at varying initial water concentrations, and see how cell responds to the changing environment. Again, they should document their observations for post-lab discussion.
- 5) Have the students complete a wet-lab experiment based on the previous direct instruction and activity. This wet lab procedure utilizes an elodea plant cell wet-mount viewed under a microscope at 400X. One slide would contain a drop of tap water or ddH₂O + elodea leaf + coverslip. The students should draw a picture of the plant cell's appearance. A 5% salt solution will be added one drop at a time, with the students drawing what they observe happens after each drop is administered.

- 6) Review concepts of diffusion and osmosis. Ask and assign a couple of thought provoking questions for students to brainstorm involving what happens in their own body after they eat a salty snack, or after strenuous exercise and become dehydrated.