Science Objectives

- Students will define diffusion and osmosis.
- Students will describe the process by which particles of matter can or cannot move through different materials.

Vocabulary

- diffusion
- membrane
- permeable and selectively permeable
- osmosis
- passive transport
- active transport

About the Lesson

- By using a simulation, students will explore the concept of diffusion through a selectively permeable membrane.
- As a result, students will:
  - Conduct experiments related to diffusion and osmosis in a range of settings.
  - Define diffusion and osmosis.
  - Describe the process by which particles of matter can or cannot move through different materials.

TI-Nspire™ Navigator™

- Quick Poll
- Send/Receive files

Activity Materials

- Compatible TI Technologies: TI- Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software

Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- Exploring_Diffusion_Student.pdf
- Exploring_Diffusion_Student.doc

TI-Nspire document

- Exploring_Diffusion.tns

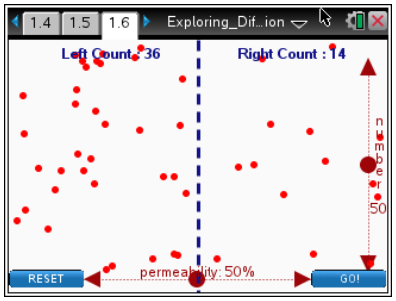
Discussion Points and Possible Answers

Start on page 1.6.

After reading introductory information on their activity sheets, students move to page 1.6 of the activity. Students will use the **permeability** slider (or arrow keys) to change the permeability of the membrane, from 0 to 100%, and the **number** slider (or arrow keys) to change the number of particles. They will observe the effects of these changes and answer questions.

Tech Tip: Students should select "GO!" and "STOP" to start and stop the simulation. They can select "RESET" to reset the simulation to the initial state.

Move to pages 1.7 – 1.11.



1. Set the permeability slider to 0%. Set the number of particles (*number*) to 50. Look to the RIGHT side of the membrane. We might expect to see_____ particles.

   Answer: 0 particles.

2. Set the permeability slider to 50%. Set the number of particles (*number*) to 50. Look to the RIGHT side of the membrane. We might expect to see_____ particles.

   Answer: Less than 25.

3. Set the permeability slider to 100%. Set the number of particles to 50. Look to the RIGHT side of the membrane. We might expect to see_____ particles.

   Answer: Less than 25.

4. Set the number of particles to 20. To observe around 5 particles on the RIGHT side of the membrane, what would the permeability need to be?

   Answer: 25%.

5. In each example, you have been directed to observe the number of particles on the RIGHT side of the membrane. Explain the relationship between the concentration of particles and the direction of movement.

   Answer: The left side has the higher concentration of particles and diffusion involves particles moving from higher to lower concentrations – from left to right in this example.

TI-Nspire Navigator Opportunity:

Use Quick Poll and Live Presenter to assess student understanding throughout the exploration.

Wrap Up

Students should be prepared to explain their conclusions, along with demonstrating an understanding of diffusion and osmosis.

Assessment

Teacher should collect completed .tns files from class and use these to assess student learning and understanding.