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Activity 3:8: Diffusion

Cells are similar to the space station, because you need to bring food, water, and other supplies by shuttles from Earth in order to survive in the space station. The space station has to be able to accept the food, water, and supplies and remove waste. Special doors allow materials to enter and leave without collapsing the space station.

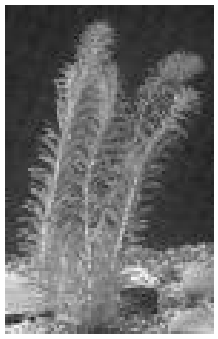
Cells also have structures that protect them from the outside environment. Cells have a cell membrane, which separate the cell from the outside. The cell membrane acts like a door or gate and controls what comes in and out of the cell.

Objective:

We will analyze cell transport in order to explain how cells carry out the life processes.

Materials:

Elodea plant	saline solution
microscope	dropper
microscope slides	coverslips
beaker	food coloring



Procedures:

Activity #1: Diffusion

1.Predict what will happen if the teacher adds a few drops of food coloring to the beaker of water. Justify your response with prior knowledge.

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2.Observe the teacher demonstration.

3.Describe the movement of the food coloring. You may create a detailed diagram.

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4.Read the following selection, "Diffusion," to discover why the food coloring moves throughout the water.

Diffusion

Substances are made of molecules. The food coloring and water in the demonstration are made of molecules. Molecules are always moving. As they move, the molecules bump into each other. The more molecules in a given area, the more collisions there will be. Collisions can cause the molecules to push away from each other. Over time, the molecules of a substance will continue to spread out. Eventually, they will be spread evenly through the area. Diffusion is the process by which molecules move from an area of higher concentration of molecules to an area of lower concentration of molecules.

5.Reread and highlight or underline the definition of diffusion.
6.Explain why the molecules of food coloring in the demonstration move throughout the water in the beaker. Use evidence from the demonstration and the reading selection to support your response.

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Activity #2: Diffusion in Cells

7.Read the selection, "Diffusion in Cells."

Diffusion in Cells

The cell membrane is selectively permeable; meaning, some substances can pass through the membrane while others cannot. The main method by which substances such as water, oxygen, and carbon dioxide move into and out of the cell is by diffusion. Molecules of oxygen, water, and carbon dioxide can pass through the cell membrane easily by moving from areas of high concentration to areas of low concentration. For example, if there is a higher concentration of water molecules on the outside of the cell, then the water molecules will move through the cell membrane and into the cell. If the concentration of water molecules is higher inside the cell, then the water molecules will move to the outside of the cell. The diffusion of water molecules through a selectively permeable membrane is called osmosis. Osmosis is important to cells because cells do not function properly without adequate water.

8.Reread and highlight the definition of osmosis.

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9.Draw arrows in Figure 1 and Figure 2 to show the direction that the water molecules would move across the cell membrane. Use information from the reading to help make your diagram.

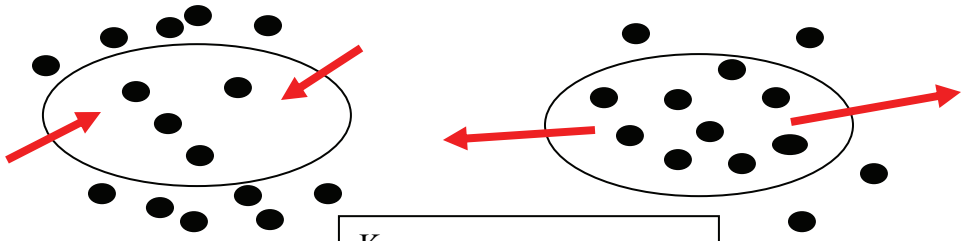

Figure 1

Key:
-animal cell membrane
- water molecule

Figure 2

10.Explain the direction of the flow of water across the cell membrane in Figure 1 and Figure 2. Use information from the investigation to support your placement.

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Activity #3: Modeling Diffusion in a Cell

11.Read the procedures, "Modeling Diffusion in a Cell."

Modeling Diffusion is a Cell

1. Remove a leaf from the tip of an Elodea plant.
2. Make a wet mount slide of the Elodea plant using fresh water.
3. Examine the leaf under the low-power objective of our microscope.
4. Draw and label the parts of the cell you observe in Diagram 1, "Elodea Cell in Water."
5. Add several drops of a saline solution to the edge of the coverslip.
6. Touch the opposite side of the coverslip with a paper towel. The paper towel will draw the saline solution over the leaf.
7. Examine the Elodea leaf again under the low-power objective on the microscope.
8. Draw and label the parts of the cell you observe in Diagram 2, "Elodea Cell in Saline Solution.
9. Remove the slide from the microscope and clean up as directed by your teacher.

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Activity 3:8: Diffusion

12.Construct an appropriate hypothesis before beginning the investigation. (Remember to use the If_____, then_____, because _____. format.)

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13.Draw a detailed diagram for each slide. Label if you were using low or high power.

Diagram 1
Elodea Cell in Water

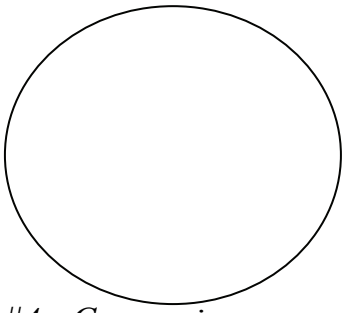
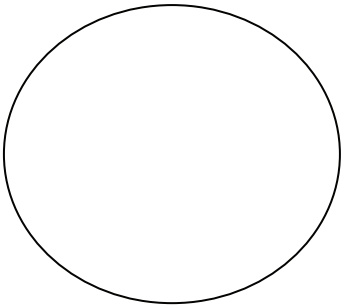


Diagram 2
Elodea Cell in Saline Solution



Activity #4: Comparing

14.Compare the appearance of the Elodea cells in Diagram 1 with those in Diagram 2. Use evidence from the investigation to support your response.

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15. Review your hypothesis. Determine the validity of your hypothesis based on the results of the investigation.

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Analysis:

1.Explain why the Elodea cells appear different in the saline solution. Use your knowledge of osmosis to support your answer.

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Activity 3:8: Diffusion

2.Describe the role of the cell membrane in carrying out the life processes. Use evidence from the investigation and prior knowledge to support your response.

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3.In plants, the cell wall surrounds the cell membrane. State a conclusion as to the permeability of the cell wall. Use evidence from this investigation and from the reading to support your response.

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