

Cell Experiments

Objectives:

- Define the terms “diffusion,” “cell membrane,” and “semipermeable”
- Observe water-soluble ink diffusing into water
- Observe the semipermeable nature of a membrane using iodine and a freezer bag

Missouri Curriculum Frameworks:

5–8:

Strand VII. Living Systems (A. Structure/Function/Characteristics)

4a. use appropriate technology to get a visual understanding of organelles; conduct investigations and research on the structure and function of various cell organelles (1.2, 1.4, 2.7)

Materials:

“Diffusion” Activity:

large clear jar of water

dropper

water-soluble ink

“Cell Membrane” Activity:

large clear jar of water

iodine

freezer bag

small rubber band

constarch

Discussion:

Diffusion means “spreading out,” and it occurs when chemicals move through the fluid inside a cell. Chemicals move from places of high concentration (where there is a large amount of the chemical) to places of low concentration (where there is a smaller amount of the chemical). Oxygen, carbon dioxide, glucose, and minerals such as calcium move around the cell through the process of diffusion. In this experiment, you will get to see firsthand how diffusion works using water and water-soluble ink.

“Diffusion” Activity

1. Fill the dropper with ink by placing the tip of the dropper into the ink and squeezing the dropper. Gently tap the dropper on the side of the inkbottle to remove any air bubbles.
2. Remove the dropper from the ink, and slowly lower the dropper into the jar of water. When the tip of the dropper is touching the bottom of the jar, squeeze out a large blob of ink, and slowly remove the dropper from the water so that you do not disturb the ink.
3. Leave the jar undisturbed for several hours. Then examine the jar. Is the blob of ink still there? What happened to the ink?

Discussion:

As you saw in the previous activity, large concentrations of a fluid will often spread out, or diffuse, into surrounding fluids. To prevent all of the fluids within a cell from diffusing with

fluids on the outside, cells have to have a protective barrier to keep some molecules in and other molecules out. This barrier is known as the cell membrane. However, the cell membrane does not prevent all molecules from passing through it. It is “semipermeable,” which means that it lets water molecules pass through freely because they are small, but it does not allow larger molecules to pass freely. In this next experiment, you will use a freezer bag to simulate a cell membrane, and you will observe how fluids can pass through the freezer bag “membrane.”

“Cell Membrane” Activity

1. Put 2 tablespoons of cornstarch into the freezer bag, and mix just enough water with the cornstarch to cause the bag to sink when it is placed in the jar of water.
2. Seal the bag closed with the rubber band, and lower the bag into the jar of water, making sure that the tied part of the bag remains above the surface of the water to prevent water from leaking in through the top.
3. Add a few drops of iodine into the water in the jar. The iodine will turn the water pale brown. Leave the jar undisturbed overnight.
4. Remove the bag from the jar the next day, and observed what happened. (The iodine molecules were small enough to pass into the bag, and they reacted with the cornstarch, turning it blue-black. The cornstarch molecules, however, were too big to pass through the bag into the water, so the water remained unchanged.)



Cell Experiments Lab Write Up

Name _____

Date _____

Please answer the following questions in complete sentences.

“Diffusion” Activity

1. What is diffusion?

2. When you first squeezed the concentrated blob of ink into the water, what did the ink do?

3. After a few hours, what happened to the concentrated blob of ink in the water?

“Cell Membrane” Activity

4. What is a cell membrane? What does it mean that a cell membrane is semipermeable?

5. What happened to the cornstarch when you left it sitting in the iodine water mixture overnight? Why?

6. What happened to the water and iodine mixture when you left the bag of cornstarch sitting in it overnight?



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