

Membranes

Overview Here's a fun experiment that shows you how much stuff can pass through a membrane. Scientists call it the *semi-permeability of membranes*.

What to Learn There are actually many hints that tell us something is alive. One thing that is true about all living things is that they all have tiny structures called cells. **Cells** are the smallest objects that can do all the things needed for life. One way substances can get into a cell is called passive transport. One special kind of passive transport is osmosis, when water crosses into the cell.

This experiment allows you to see the process of osmosis in action. You should observe that the celery in the fresh water becomes a little stiffer, while the celery in salt water becomes rather flimsy. Remember that cells are made of cells and that the water in the cells flows from areas of low salt concentration (high water concentration) to high salt concentration (low water concentration). That means that if the water outside the cell is saltier than the water inside, water will move from the inside of the cell to the outside. As the water leaves the cell it is like letting the air out of a balloon. As more and more of the cells lost water, the celery becomes soft and flexible. If the water inside is saltier, the opposite happens, and some water will go into the cells, stiffening them up.

Materials

- 2 pieces of celery stalk
- salt
- 2 glasses
- a sensitive scale to weigh the celery

Experiment

1. First, weigh the celery (both pieces) and record this in your journal.
2. Next, make your hypotonic solution (plain water). Fill a glass with water and stick your celery in for ten minutes.
3. Remove the piece of celery and pat dry. Weigh it again and record your results. If you don't see a weight difference, dip it in again for ten more minutes. Pat dry and weigh again.
4. Now make your hypertonic solution (salt water). Add a small amount of salt to the water (keep adding until no more can be dissolved and a small amount remains on the bottom).
5. Weigh the second celery stalk and record it in your journal. Add this new celery stalk to the water. Wait impatiently for ten minutes. Remove and record the weight. Did you notice a difference? (Note – if you left the first one in for 20 minutes, make sure to leave this one in for the same amount of time.)
6. What effect did the salt solution have on the celery? Did it change in appearance? Did it feel different? Record your results in your journal!
7. Create a Data Table.

Membranes Data Table

Solution	Time in Solution	Weight Before	Weight After

Reading

There are actually many hints that tell us something is alive. One thing that is true about all living things is that they all have tiny structures called cells. **Cells** are the smallest objects that can do all the things needed for life. One way substances can get into a cell is called passive transport. One special kind of passive transport is osmosis, when water crosses into the cell.

Exercises

1. In what direction does water move?
2. What is the process by which water crosses membranes by itself?
3. What are all living things made of?
4. Did the celery in the fresh water weigh more or less? Why?
5. Did the celery in the salt water weigh more or less after a few minutes?

Answers to Exercises: Membranes

1. In what direction does water move? (from highest to lowest concentration).
2. What is the process by which water crosses membranes by itself? (osmosis).
3. What are all living things made of? (cells, which are mostly water)
4. Did the celery in the fresh water weigh more or less? Why? (Less. Because there is a higher concentration of water outside of the celery, so the water moved from outside (higher concentration) to inside the celery (lower concentration of water). This makes the celery weigh more).
5. Did the celery in the salt water weigh more or less after a few minutes? Why? (It weighed more, because water moved from higher concentration in the celery to lower concentration of water, outside the celery. This made the celery weigh less)