

HUMAN BODY

SECTION 7-OSMOSIS

From *Hands on Science* by Linda Poore, 2003.



Westminster College

STANDARDS:

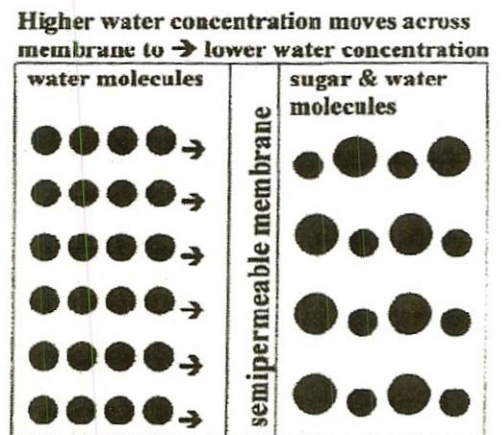
Students will write a report of an investigation that includes tests conducted, data collected or evidence examined, and conclusions drawn.

Students know many multicellular organisms have specialized structures to support the transport of materials.

Students know how blood circulates through the heart chambers, lungs, and body, and how carbon dioxide (CO₂) and oxygen (O₂) are exchanged in the lungs and tissues.

NOTE:

OSMOSIS is the movement (diffusion) of water in and out of cells. Water moves from an area of higher concentration of water to an area of lower concentration of water through a cell membrane. Thus it enters a cell full of waste, diluting the particle concentration. The cell then has a higher concentration of water than the blood, thus water carries waste from inside the cell into the blood, moving towards the lower concentration of water. The blood carries waste to the kidneys. Kidneys filter waste from the blood and send the waste to the bladder to be expelled from the body.



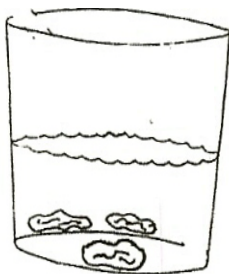
MATERIALS:

For The Class
8 cups water
45 raisins

transparency of ↑

EXPLORE:

HOW DOES THE BLOOD ENTER THE CELL WALL?



1. Give each team of 4 students 5 raisins. Observe the size and shape of raisins. Feel raisins, Describe. Place 4 raisins in a cup of water, keeping one raisin dry for comparison. Predict what will happen.
2. Observe after 30 minutes. Feel the raisins. Record your observation. Discuss results (raisins fill with water, expand, are squishy)

Water enters raisins, as there is a lower concentration of water and more dissolved material in the raisin.

Blood enters a cell full of waste like the water entered the raisin.

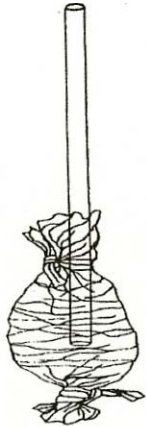
MATERIALS:

20 cm (8") dialysis tubing
 corn syrup
 1 pint jar
 4 metal twist-ties
 2 clear straws
 2 cups
 red food coloring

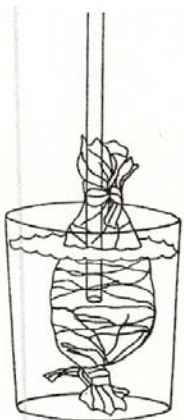
DEMONSTRATE:

OSMOSIS

DOES WATER DIFFUSE THROUGH THE CELL WALL?



↑ THE CELL
 50% corn syrup



↑ BLOOD VESSEL
 (Red water in cup)

1. **'THE BLOOD VESSEL'**
 Fill the cup with water and add red coloring to indicate the blood. The cup represents the blood.
2. **THE 'CELL'**
 Cut a 20 cm (8") piece of dialysis tubing and fold one end over three times in 1 cm folds. Twist tightly and tie this end closed with a metal 'twist tie'. *Open the other end by soaking it* in water for 1 minutes and rubbing your thumb and forefinger together as you would to open a plastic vegetable bag at the grocery store. This tubing represents the cell.
3. Make a mixture of $\frac{1}{2}$ corn syrup and $\frac{1}{2}$ water in the dialysis tube. Push the straw into this liquid mixture in the tubing and close the top tightly with a twist-tie. Make sure students notice that the syrup is thick and viscous and thus has 'more dissolved materials' than the red water of 'blood'.
4. Place this cell model in the cup of red water so the tubing is $\frac{3}{4}$ submerged in the cup.
5. **OBSERVE OSMOSIS.**
 The 'cell' is full of waste and has a lower concentration of water than the 'blood.' Red water from the cup moves towards this area with a lower concentration of water, entering a 'dialysis tube' cell. Red water eventually moves up the straw as the dialysis tube fills, showing how 'blood' can enter the cell by osmosis and carry oxygen and nutrients into the cell.

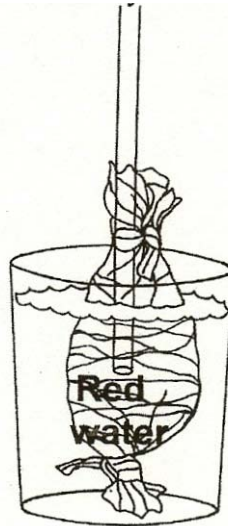
6. Eventually, enough 'blood' moves into the cell, so the cell now has more water (percent) than the blood. The process reverses and the waste products leave the cell.

ASSESSMENT:

1. What would happen if you put the colored water in the tubing and the corn syrup/water mixture in the cup? Explain your prediction
2. Use the *Science Experiment* form to write a question that you want to answer in the experiment, list the procedure you would use, and predict the results. Draw the way you set up the materials, and then draw the results you predict will happen.
3. Observe the teacher's demonstration of this experiment.
4. Complete your report, showing results you observed and conclusions on the lines provided.

Answers: Red water will move from the tubing into the cup because the cup now has a lower concentration of water and more dissolved materials. You will notice less liquid in the tubing and the cup's solution becomes reddish. In the cell waste products, including CO₂ are moved from the cell to the blood and carried to the kidneys. The kidneys filter the waste out of the blood.

Cup has 50% corn syrup →
'Cell' has red water



Science Experiment

QUESTION:

PREDICTION:

PROCEDURES:

RESULTS

This is what it looked like at the start. **DRAW** This is what I predict will happen.

--	--

RESULTS:

CONCLUSIONS (WHAT DID YOU LEARN?)
