OSMOSIS INVESTIGATION

OBJECTIVE/RATIONALE

Osmosis is an integral part of maintaining homeostasis. The student will investigate the process of osmosis and the effects of various solutions on red blood cells.

TEKS 121.15 1A, 2B, 2C, 2D, 5A, 6B

TAKS ELA 1, 5
Science 1, 3, 4

National Science Education Standards A9-12; C9-12; F9-12; G9-12
National Health Care Skills Standards .01, .02, .03, .04, .05, .06, .07
National Curriculum Standards for School Mathematics S1; S3

KEY POINTS

1. Osmosis is the process that allows water to move through a selectively permeable membrane from a region of higher concentration to a region of lower concentration.
2. Osmotic pressure is the force that moves water through the membrane. The pressure depends on the concentration of solutes. The greater the number of solutes, the greater the pressure. Osmotic pressure may be thought of as a pulling pressure since water follows the solutes.
3. Isotonic solutions - solution that has the same concentration of solutes as a cell.
4. Hypertonic solutions - a solution that has a greater concentration of solutes than a cell.
5. Hypotonic solutions - a solution that has a lower concentration of solutes than a cell.
6. Tonicity - the effect of solutions on cells.

ACTIVITIES

I. Completion of the Osmosis and Red Blood Cell Laboratory Investigation.

MATERIALS/RESOURCES

Gloves
Goggles.
Blood (sheep blood, cow blood, pre-tested blood donated by a medical laboratory, etc.)
Microscopes, microscope slides, cover slips
Eye dropper
wax pencil
Isotonic solution (.9% saline solution)
Hypotonic solution (Distilled water)

Hypertonic solution (2 % saline solution)
Biohazard containers
Surface disinfectant
Paper towels

ASSESSMENT

Laboratory Investigation Rubric

ACCOMODATIONS

For reinforcement the student will review and repeat the laboratory investigation.

For enrichment, the student will research and report on the function of the kidneys in congestive heart failure and determine the cause of ascites.

REFLECTIONS

OSMOSIS AND RED BLOOD CELL
Laboratory Investigation

Purpose:
In this laboratory investigation, the student will investigate the process of osmosis and the effects of various solutions on red blood cells.

Background Information:

Materials:
Gloves
Goggles.
Blood supplied by the teacher.
Microscopes, microscope slides, cover slips
Eye dropper
wax pencil
Isotonic solution (.9% saline solution)
Hypotonic solution (Distilled water)
Hypertonic solution (2 % saline solution)
Biohazard containers
Surface disinfectant
Paper towels

Procedure:
1. Wash hands and put on gloves and goggles.
2. Assemble equipment and materials. Obtain blood sample from instructor.
3. Prepare work area.
4. Label the microscope slides as Isotonic, Hypertonic or Hypotonic.
5. Place a drop of blood on each slide and place a cover slip on it.
6. Place the slide on the microscope.
7. Observe and draw red blood cell.
8. Add a drop of the appropriate solution to the slide labeled as Isotonic, Hypotonic or Hypertonic. Place the drop on the outer edge of the coverslip. Observe and draw red blood cell.
9. Repeat for each slide.

10. Observe any changes in the red blood cell as osmosis takes place.
11. Clean work area with surface disinfectant. Remove goggles and gloves and wash hands.

Data:

1. Observe and draw a red blood cell.

2. Observe and draw a red blood cell in an isotonic solution.

3. Observe and draw a red blood cell in a hypertonic solution.

4. Observe and draw a red blood cell in a hypotonic solution.

Conclusion:

1. Explain the relationship of a red blood cell's shape to its function.

2. Explain what happens to cells when placed in an isotonic solution. Describe the affect on it's function.

3. Explain what happens to the cell when placed in a hypertonic solution. How would this affect the red blood cell's function?

4. Explain what happens to the cell when placed in a hypertonic solution. How would this affect the red blood cell's function?

5. Predict how the body attempts to restore homeostasis.

6. Describe two diseases/disorders related to electrolyte imbalance including information about hypertonic and hypotonic conditions of nitrogen, calcium, sodium, and potassium.