

Research Experiences for Teachers (RET) – 2011

LESSON PLAN TEMPLATE

MODULE TOPIC: Membrane Transport

RATIONALE: Nanotechnology will be the new means for big pharma to incorporate a “better” product delivery system for the consumer.

STANDARD(S) & INDICATOR(S):

- 5.1.12.B.2. Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
- 5.3.12.A.3. Predict a cell’s response in a given set of environmental conditions.

OBJECTIVE(S): SWBAT

1. Identify the major macromolecules within the cell membrane based on a prior knowledge of carbohydrates, lipids and proteins.
2. Compare and contrast (passive and active membrane transport).
3. Differentiate between osmosis and diffusion and give examples of each.
4. Discuss the reasons for the different modes of transport (size, gradient, solubility).

MATERIALS:

Lab worksheet, plastic baggie, iodine (IKI), cornstarch, potato, pipette, water, beaker, string

LIST OF HANDOUTS (attach original copies of each handout - teacher & student edition)

BACKGROUND INFORMATION:

- Osmosis is the diffusion of water molecules
- Concentration gradients
- Cornstarch as an indicator of carbohydrates
- Molecule size

CLASSROOM ACTIVITY DESCRIPTION (LABORATORY/EXERCISES/PROBLEMS) including detailed procedures:

1. Students were allowed to make their own groups of three.
2. Brief overview of materials was orally given and shown for each lab group.
3. Lab groups were to go to lab tables and pick up their material’s and wait for further instruction.
4. I verbally told the groups what to do step by step and they were responsible to write the instructions in a lab notebook.
5. During the data period, we discussed what should happen; also why the string used was turning purple.
6. At the completion of the lab they were to clean up and compare data with other groups and discuss their findings.
7. Another question was posed. “What could we do to incorporate more numbers into this lab to increase data?” Answers centered on weighing the bags before and after the experiment.

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SAMPLE QUESTIONS TO ELICIT CLASS DISCUSSION:

1. Why do some medicines take longer to work than others?
2. How can the pharmaceutical industry make medicine work faster?
 - a. Use the drug more effectively? (ie less excipients, more drug)
3. What is “wrong” with our current methods? (ie. time, money, waste)

HOMEWORK ACTIVITY/EXERCISES/PROBLEMS:

1. Chapter questions
2. Lab Assignment
3. Worksheet

PARAMETERS TO EVALUATE STUDENT WORK PRODUCTS:

1. Laboratory report showing diffusion as a mode of membrane transport.
2. Exams on:
 - a. Structure and composition of membranes.
 - b. Variables relevant to different modes of transport.

REFERENCES:

- www.biologycorner.com
- Miller and Levoine. Biology (Dragonfly Book). Prentice Hall, 2002.

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