

Laboratory 5: Diffusion and Osmosis - Transport Across Cell Membranes

Objectives:

- To understand the mechanisms used to move molecules across membranes including simple diffusion facilitated diffusion, osmosis, and active transport.
- To apply the principles of molecular movement across membranes to living plant and animal cells.

Introduction

Through a series of exercises, the principles of moving molecules across selectively permeable membranes will be studied. Each exercise will reveal a different, yet related, aspect of transportation into and out of cells. Bear in mind that these principles are put into practice continually by cells trying to function and maintain homeostasis in an ever- changing environment. Please review the concepts of diffusion, osmosis, and active transport in Chapter 5 of your text.

In part A of the lab, we will demonstrate osmosis using potato cylinders placed into different concentrations of salt. Depending on whether the solutions are hypotonic, isotonic, or hypertonic, the osmosis will occur into or out of the potato. Measure the weight of the potato before and after submersion in the solution will allow us to determine the direction of water movement.

In part B of the lab, we will determine the effect of time on diffusion using colored agar blocks. The colored agar blocks will incubate in vinegar for different amounts of time. At each time point, an agar block will be removed, sliced in half, and the distance of diffusion of the vinegar determined.

Part C will allow us to microscopically observe the changes due to a hypotonic, isotonic, and hypertonic solutions on the structures of both plant and animal cells.

In part D will model the difference between facilitated diffusion and active transport using a kit with pipe cleaners and beads representing molecules of interest.

Procedure

Part A: Osmosis

1. Obtain five test tubes and five cylinders of potatoes.
2. Label the test tubes A through E.
3. Describe the appearance and texture of the potato cylinders on the *In-Lab Report Sheet*.
4. Weigh a potato cylinder and place it in one of the test tubes. Record the weight of the potato in Table 1 of your *In-Lab Report Sheet*.
5. Repeat step 4 for all remaining potato cylinders.
6. In test tube A, add enough distilled water to completely cover the potato.
7. In test tube B, add enough 0.5% NaCl solution to completely cover the potato.
8. In test tube C, add enough 1% NaCl solution to completely cover the potato.

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Wenbin Ji



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