

Name _____

Course/Section _____

Date _____

Professor/TA _____



Activity 7.1 What controls the movement of materials into and out of the cell?

1. To be alive, most cells must maintain a relatively constant internal environment. To do this, they must be able to control the movement of materials into and out of the cell.

What characteristics of the cell membrane determine what gets into the cell and what doesn't? That is, what determines the permeability of a cell or organelle membrane? To answer these questions, first consider the answers to the following questions:

a. If a cell membrane were composed of only a phospholipid bilayer, what properties would it have?	b. What different roles or functions do membrane proteins serve?	c. Why are some cells types more permeable to a substance (for example, sodium ions) than others?

Using your understanding of the answers in a-c, now answer these questions: What characteristics of the cell membrane determine what gets into the cell and what doesn't? That is, what determines the permeability of a cell or organelle membrane?



2. You design an experiment to test the effect(s) various compounds have on the osmotic potential of a model cell. You know that substances dissolved in aqueous or gaseous solutions tend to diffuse regions of higher concentration to regions of lower concentration.

You fill each of three (20 ml) dialysis bags half full with one of these substances:

- 5% by weight of glucose in distilled water
- 5% by weight of egg albumin (protein) in distilled water
- 5% by weight of glass bead (one glass bead) in distilled water

The dialysis bag is permeable to water but impermeable to glucose, albumin, and glass bead.

- If the final weight of each bag is 10 g, how many grams of glucose, albumin, and glass bead were added to each bag?
- The molecular weight of the protein is about 45 kilodaltons, and the molecular weight of glucose is about 180 daltons. How can you estimate the number of molecules of glucose in the 5% solution compared to the number of albumin molecules in its 5% solution?
- You put the dialysis bags into three separate flasks of distilled water. After 2 hours, you remove the bags and record these weights:

Dialysis bag	Weight
Glucose	13.2 g
Albumin	10.1 g
Glass bead	10.0 g

How do you explain these results? (*Hint: Consider the surface area-to-volume ratio of each of the three substances and review pages 49 and 50 of *Biology*, 7th edition.*)

- What results would you predict if you set up a similar experiment but used 5% glucose and 5% sucrose?