LAB #5
DIFFUSION AND OSMOSIS

I. What is **diffusion**?

A. The movement of molecules from high concentrations to low concentrations, down a concentration gradient.

1.) Molecules move because they possess their own kinetic energy

a.) Molecules move easily in a gaseous form

b.) Molecules move in a liquid form

c.) Molecules sit in place and vibrate in a solid form

2.) This is a passive process because the molecules move on their own, without help

3.) Each substance move down its own concentration gradient

B. **Osmosis** is a special kind of diffusion where water molecules move down their concentration gradient

1.) Consider the overhead picture depicting osmosis.

a.) There are large solute particles dissolved in water.

1. The volume of water on both sides is equal
2. The concentration of solute is unequal

b.) The membrane pores will only allow the water to pass through.

c.) The water diffuses through the membrane from the side of the lowest concentration of solutes to the side of the greater concentration of the solute.

d.) The ultimate outcome

1. The two sides will eventually be equal in concentration of solutes.
2. The volumes of water on each side of the membrane will be unequal.

2.) Membranes of cells allow free movement of water molecules, but restrict larger molecules from passing through

3.) We can compare solutions according to their solute concentration.

a.) **Hypertonic** solution

1. Higher concentration of solutes compared to another solution (Gr. hyper = over, above)

Memory aids: hypertension, hyperactive, hyperventilate

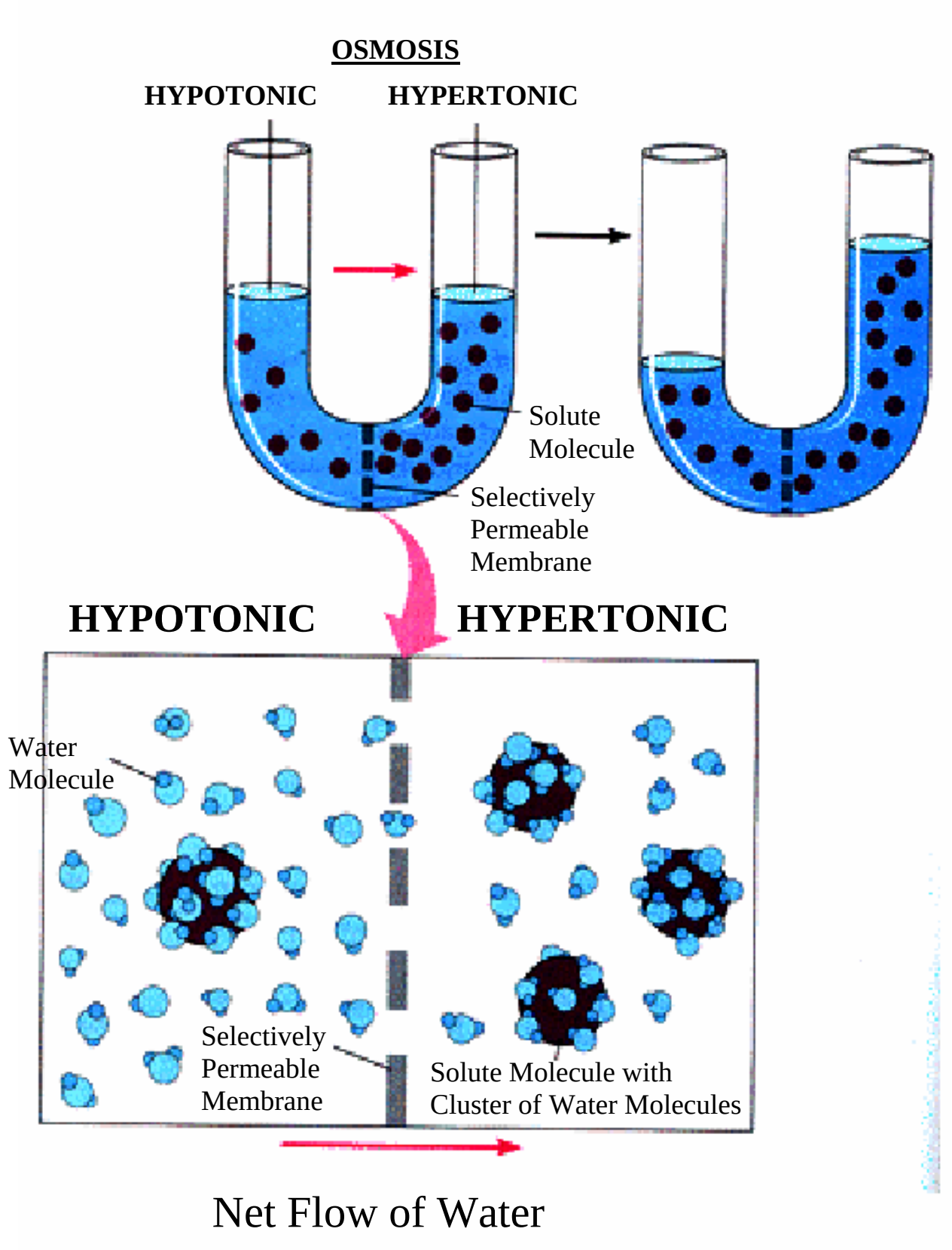
2. If a cell is placed in a hypertonic solution, water will diffuse out of the cell and the cell will shrivel
3. Seawater is hypertonic compared to your body cells. See why it's not wise to drink it? Imagine dieing of dehydration because you drank salt water.

b.) **Hypotonic** solution

1. Lower concentration of solutes compared to another solution (Gr. hypo = below, under, less than)
   Memory aids: hypoglycemia, hypothermia
2. If a cell is placed in a hypotonic solution, water will diffuse into the cell and the cell will swell and may burst.

c.) **Isotonic** solution

Equal concentration of solutions compared with another solution
(Iso = equal)


OSMOSIS
HYPOTONIC
HYPERTONIC
Solute Molecule
Selectively Permeable Membrane
HYPOTONIC
HYPERTONIC
Water Molecule
Selectively Permeable Membrane
Solute Molecule with Cluster of Water Molecules
Net Flow of Water

II. In the lab today you will:

A. Observe Brownian movement

1.) Add a small amount of carmine powder to a droplet of water and observe under a microscope

B. Observe diffusion through a selectively permeable membrane

1.) This experiment may be performed by the instructor or by one lab group chosen to conduct the experiment

2.) Will large particles (sugar, glucose) move through the membrane?

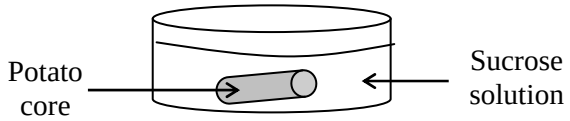
3.) Will smaller particles (I_2KI) move through the membrane?

C. Investigate the osmolarity of potato cells

1.) Potato cores will be monitored in solutions of different tonicity to determine their weight change (each lab table will use one solution

a.) DI water
b.) 0.1M sucrose
c.) 0.2M sucrose
d.) 0.3M sucrose
e.) 0.4M sucrose
f.) 0.5M sucrose
g.) 0.6M sucrose

2.) The potato cores should be approximately the same size and trimmed so that no skin is on the core. Cutting the cores lengthwise will help by creating more surface area for diffusion to occur.



3.) Questions: Will the potato gain or lose mass over time when immersed the sucrose solutions? What is the apparent molarity of a potato cell based on your results?

D. A lab report over the potato and selectively permeable membrane experiment will be due at the beginning of the next lab.