# **Bio. 430 Name : Ashyria \_\_\_**

# **LBL-Osmosis**

**Define the following terms (6 points):**

Solution- a solution is a homogenous mixture which is composed of the addition of two or more than two substances. A solution consists of a solute, and a solvent. The solute is dissolved in the solvent e.g. mixing of water in the table salt creates a solution. Water is the solvent and salt is the solute.

Concentration- Concentration is referred to the components of a mixture or a solution. In other words, it is also said that concentration is the amount of a substance occupied per defined space. In terms of biology, it is the amount of solvent with respect to the solvent, or the total mixture.

Diffusion- the movement of molecules or ions down a concentrated gradient due to their kinetic energy until they reach equilibrium.

Osmosis- passive movement of water molecules across a selective permeable membrane from an area of higher to lower water concentration until equilibrium is reached.

Semipermeable- A semipermeable membrane is a biological membrane which has the capability of allowing of certain ions or molecules to pass through it, but prevents the others. Mostly, prohibited molecules are solutes. For example, cell membrane

Hydrostatic pressure-Sometimes, due to the force of gravity, a fluid at its equilibrium state exerts a pressure. This pressure is known as the Hydrostatic Pressure which increases as the depth of the water increases as measured from the above.

The diagrams below show U-shaped tubes separated by a semipermeable membrane that only water can cross. At Time0, the arms of the tubes were filled with aqueous solutions of varying concentrations. For each tube, **draw** an arrow to show the direction of net osmosis over time. (2 points)

**0.9 mM NaCl**

**0.5 mM NaCl**

**2 mM Glucose**

**5 mM Glucose**

U

U

**List four of the factors that affect the rate of diffusion. (4 points)**

1. Surface area

2. Temperature

3. Diffusion distance

4. Steepness of the concentration gradient

**Describe two reasons why net osmosis would stop. (2 points)**

1. When the amount of solute i.e water concentration is lower

2. When the amount of solute i.e water concentration is higher than needed for the equilibrium.

**Osmosis and the Real World**

**Define the following terms (4 points):**

Tonicity- It is an effective method for the measurement of the osmotic pressure gradient, defined by the water concentration and the potential of two solutions which are separated through a semi-permeable membrane.

They are of three types which are devised depending upon the concentration of the solute.

Hypertonic- The solution which has higher solutes concentration

Hypotonic- The solution which has lower solutes concentration

Isotonic- The solution which as equal solute concentration.

The diagrams below show red blood cells placed into either a hypertonic, hypotonic, or isotonic solution. **Draw** what each red blood would look like after being placed into the solution. **Describe** what happened to each cell using technical terms. (3 points)

**Before After Description**

-In the case of hypotonic, due to low concentration of water, the cells will become rigid

-In the case of hypertonic, blood cells will burst due to too much presence of the water.

-For Isotonic, the blood cells will remain in the same state for a longer amount of time because of the equilibrium state achieved.

Hypertonic solution

Hypotonic solution

Isotonic solution