

Name:

Block:

Date:

### OSMOSIS IN POTATO CELLS

Background: The 2<sup>nd</sup> Law of Thermodynamics describes the tendency for matter in the universe to become randomly distributed as Entropy(S). This tendency drives the process of diffusion. Diffusion is a force acting on matter which causes it to move from areas of high concentration to areas of lower concentration in obeisance to the 2<sup>nd</sup> law. Osmosis is a special case of diffusion, in which water diffuses across a selectively permeable membrane. In this experiment the membrane will be that of the potato cell. For our purposes we will consider the membrane of the potato to be selectively permeable to H<sub>2</sub>O only.

#### PROCEDURE: DAY 1

##### Solutions;

Obtain 3 cups and label A, B, and C

To cup A add 150ml H<sub>2</sub>O and 8.7g NaCl (stir cup until NaCl dissolves)

Decant 50ml of solution in cup A to cup B

To cup B add an additional 50ml H<sub>2</sub>O

To cup C add 100ml H<sub>2</sub>O

##### Potato Cores;

Take 3 potato cores using corer tool

Cut each to 3cm in length

Measure and record the initial mass (mass<sub>i</sub>) of each potato core

Place 1 each in cups A, B, & C

Leave overnight

#### PROCEDURE: DAY 2

##### Hypotheses

The Potato cores will have undergone a change in mass and length

Make Hypotheses for trials A, B and C as to what you expect to observe in each

Record your Hypotheses

##### Potato Cores;

Take Potato core from Cup A. Discard cup and solution

Use a paper towel to gently pat dry the potato core

Measure the final mass (mass<sub>f</sub>) of the potato core

Measure the final length (length<sub>f</sub>) of the potato core

Record Data and Repeat for tests B & C

#### DATA COLLECTION AND ANALYSIS:

DATA TABLE I: Osmosis in Potato Cells

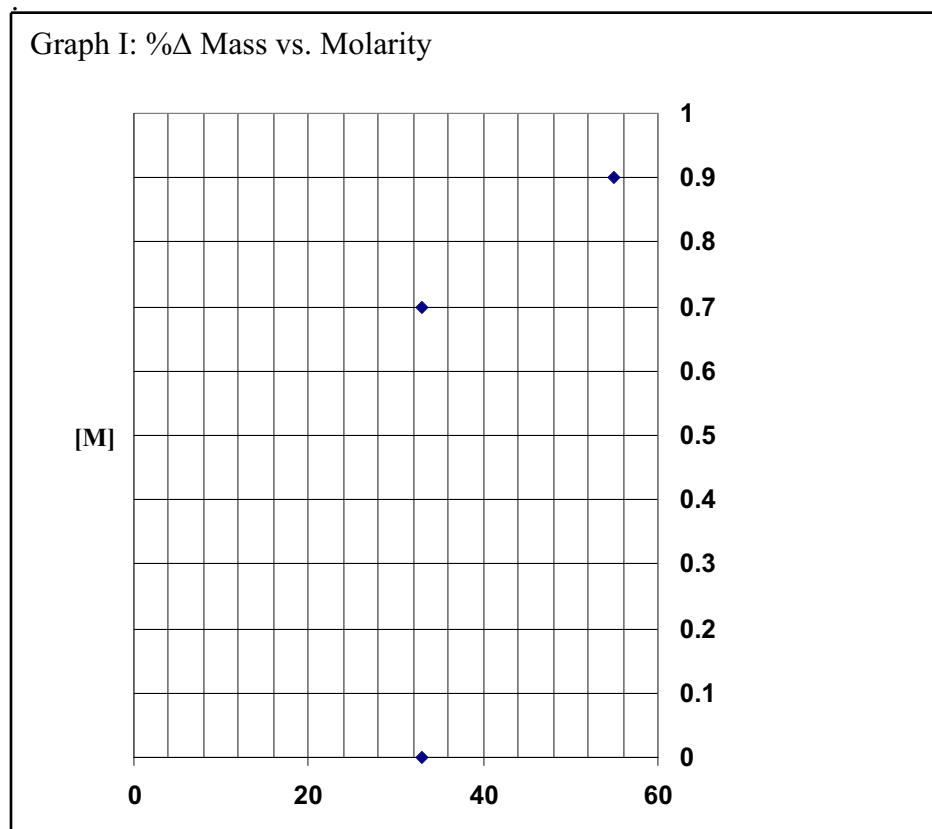
SAMPLE	Molarity	Mass <sub>i</sub>	Mass <sub>f</sub>	%Δ Mass
A				
B				
C				

## DATA COLLECTION AND ANALYSIS:

### GRAPHING:

Graph I : % $\Delta$  Mass vs Molarity

## Example



### DATA ANALYSIS:

A blow by blow account of the data sets created during your lab. Make specific note of numerical values with a brief allusion to their significance.

## **CONCLUSIONS:**

### **Guiding Questions for the Potato Lab**

Your data should reflect the effects of both hypertonic and hypotonic solutions on living cells. This change in mass must be plotted against molarity of the three solutions. Based on the outcome of the trials answer the following questions....

Does your data reflect what you might expect now that you are informed?

What kind of sources for error do you think are most likely to effect data?

What is the significance of the y-intercept on both graphs?

Who might possibly be interested in how salty a potato cell is?

In this experiment what were we able to infer from the data?

Give examples in which being able to make similar types of inferences could be advantageous.

## **SAMPLE CALCULATIONS:**

### **Calculate: Molarity of solutions A, B & C**

Remember... Molarity [M] =  $\frac{\text{\#moles of solute}}{\text{\# litres (l) of solvent}}$

Molarity is a measure of concentration

Atomic Mass is the mass in grams of one mole of an element

NaCl is a diatomic molecule with a 1:1 ration of Na to Cl

1litre(l) = 1000ml

### **Calculate: %Δ mass & %Δ length for trials A, B & C**

Generically speaking... %Δ (per cent change) is calculated using the formula

$$\% \Delta = \left\{ \frac{\text{final value} - \text{initial value}}{\text{initial value}} \right\} \times 100$$

**Note: Sample Calculations for each value should be included as an appendix to your report**

## SAMPLE LABORATORY FORMAT

LAB TITLE

Name  
Class  
Date

Lab title  
Name  
Class  
Date

### PURPOSE:

What you did & why you did it.  
Use concise language.

### PROCEDURE:

Describe parameters of experimental setup,  
including materials

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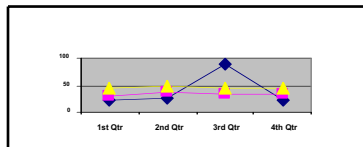
### DATA PRESENTATION:

All tables and graphs should be clearly labeled and titled and completely enclosed by dark solid lines.

Table I: Pig Experiment Data

Pigs	Mass	Slop	Bacon	Ears
Sally				
Jenny				

Graph I: Pigs vs. Slop



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### DATA ANALYSIS:

Describe the results of your experimental trials and offer statistical analysis of observed events.  
Discuss each trial and anomalous data.

### CONCLUSION:

Did the data tend to support or reject your hypothesis. What did you learn and where does this information lead you?

### SAMPLE CALCULATIONS:

Give any mathematical formulas and an example of each calculation performed using one real data set.

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