

## 1.4 Osmosis - Estimating osmolarity

### Instructions:

- Can you estimate the osmolarity of a potato?
- Follow the method outlined below
- Construct a scatter graph with a line of best fit
- Where the line intersects is the osmolarity of your potato as a percentage of solutes (see example graph)

### Hints:

- *Make sure you check your calculations for the dilutions to make the sucrose solutions*

### E.g.

- Some information to get you started:
  - [Osmosis](#)
  - [Osmolarity](#)

### Research: *(insert here)*

#### Starting point:

- *What is osmosis?*
- *How do you calculate osmolarity?*

### Research question: What is the osmolarity of a potato?

### Variables: *(from the method identify and describe the following variables)*

#### Independent:

#### Dependent:

#### Control:

### Method: [What do you expect to happen?](#)

1. *Prepare 25 mL of a series of sucrose solutions with a suitable range such as 0, 0.25, 0.5, 0.75 and 1.0 moles/ litre (e.g. 6.25mL of 1M + 18.75 mL of H<sub>2</sub>O = 25mL of 0.25 M solution)*
2. *Cut the potato using a knife into 3cm x 1cm x 1cm rectangles*
3. *Record their weight in the table below using a balance*
4. *Bathe the potato pieces in each of the different solutions for 60 minutes (minimum: they can be left overnight).*
5. *Remove the potato sample, dry, weigh and record the new mass.*
6. *Calculate percentage mass change*
7. *Repeat the experiment 3 times or gather data from three other people so you have 3 repeats for each concentration*
8. *Calculate the mean and standard deviation (if you can)*
9. *Plot the results on a graph (x-axis = moles/litre and y-axis = % mass change)*
10. *Using your graph, predict the concentration of sucrose which is in equilibrium with the potato tissue and hence calculate the Water Potential*

of the tissue in MPa by consulting the table at the foot of this page.

**Photo evidence:**

**Data:**

Sucrose (M/L)	Mass of potato (grams, g)										
	Sample 1			Sample 2			Sample 3			Mean	*Stdev
	Before	After	% change	Before	After	% change	Before	After	% change		
0											
0.25											
0.5											
0.75											
1											

\*Stdev = standard deviation  
([use excel](#))

**Data analysis** (see step 7 and 8 of the method):

**Conclusion**

Starting point:

- What was the osmolarity of your potatoes? The isotonic point ([see an example](#))
- What could be improved with the procedure to increase the precision of your data (how close your answer is to the true value, could you make it closer)?

<b>Molarity</b>	<b>0.1</b>	<b>0.2</b>	<b>0.3</b>	<b>0.4</b>	<b>0.5</b>	<b>0.6</b>	<b>0.7</b>	<b>0.8</b>	<b>0.9</b>	<b>1.0</b>	
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<b>Osmotic Potential</b>	<b>-2.7</b>	<b>-5.4</b>	<b>-8.2</b>	<b>-11.2</b>	<b>-14.5</b>	<b>-18.0</b>	<b>-21.7</b>	<b>-25.8</b>	<b>-30.1</b>	<b>-35.1</b>	<b>(atmos.)</b>
	<b>-0.27</b>	<b>-0.55</b>	<b>-0.83</b>	<b>-1.13</b>	<b>-1.46</b>	<b>-1.82</b>	<b>-2.20</b>	<b>-2.61</b>	<b>-3.05</b>	<b>-3.56</b>	<b>(MPa)</b>