

**Key terms:** osmosis, turgidity, water potential, solute concentration, hypotonic, hypertonic, isotonic

**Question:** What is the solute concentration of potato tuber tissue?

**Hypothesis:**

**Materials:**

Sucrose solutions: 0.2, 0.4, 0.6, 0.8, and 1.0 M (molar) solutions  
 \* A 1.0 molar solution is one gram molecular weight per liter. With sucrose, the molecular weight is 342 (C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>), so a 1.0 molar solution of sucrose is 342 grams in a liter of water. The other concentrations are adjusted proportionally.

Potatoes  
 Distilled water  
 250 ml Beaker  
 Foil  
 Balance  
 Ruler

**Procedure:** Day 1

Cut four 'French fry' sections of potato to 5 cm length.  
 Mass the potatoes to the nearest 0.1 gram on a small piece of aluminum foil.  
 Put the pieces (all 4) in a beaker with 75 ml of one of the four concentrations of sucrose as follows: Station 1 – Distilled Water; Station 2 – 0.2 M; Station 3 – 0.4 M; Station 4 – 0.6 M; Station 5 – 0.8M; Station 6 – 1.0 M  
 Be sure the solution covers the potato pieces.  
 Leave the potato pieces in the respective solutions overnight...labeled and covered with plastic wrap.

Day 2

Remove the potato pieces and gently blot, then mass them again to the nearest 0.1 gram.  
 Calculate % change in mass = (final mass-initial mass) divided by initial mass.  
 Record your group's % change in mass to one decimal on the table on the board.

**Safety:** Be careful using the French fry cutter, it is sharp. Also, always wash your hands after each lab.

**Variables:**

*Manipulated:*

**Data:**

Responding:

Controlled (at least 3):

Same

Same

Same

Group Data:	Solute concentration:
Initial mass	
Final mass	
Final – initial mass	
above ÷ initial mass= % change in mass	

	% solution	% change in mass
Period 1	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	
Period 2	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	
Period 3	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	
Period 4	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	
Period 6	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	
Average	Distilled water	
	0.2 M sucrose	
	0.4 M sucrose	
	0.6 M sucrose	
	0.8 M sucrose	
	1.0 M sucrose	

hypo/hyper/iso

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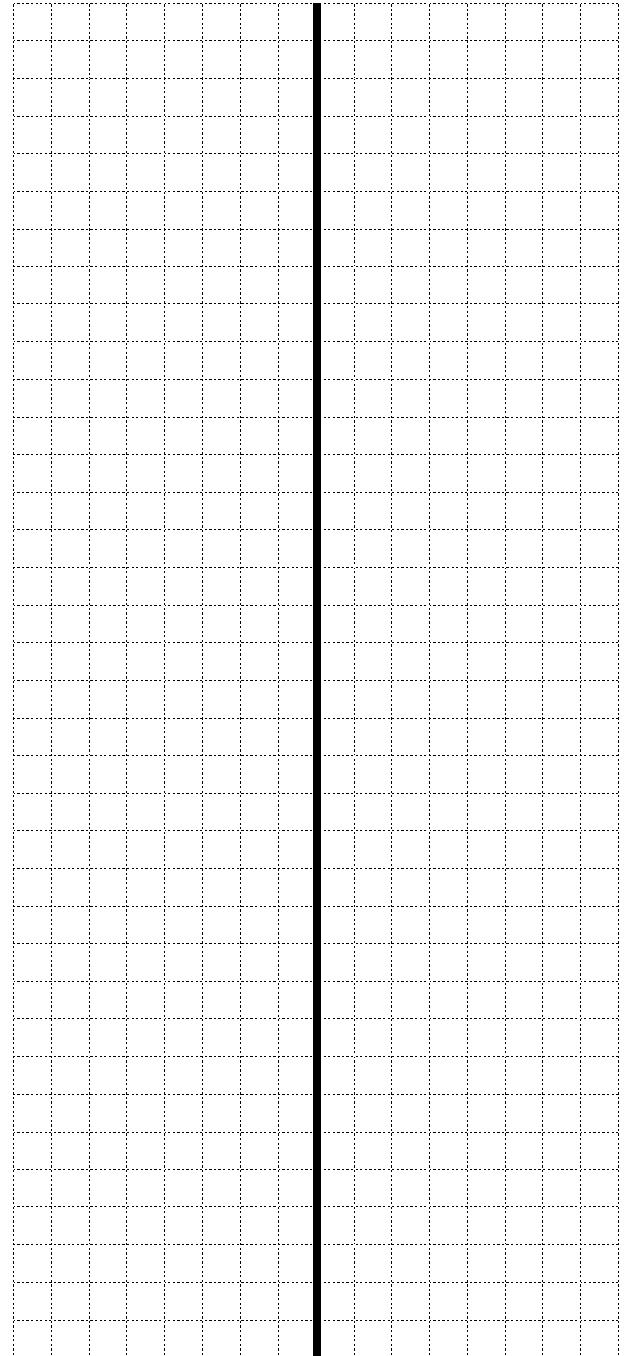
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Solute concentration

% change in mass



**Analysis:**

- Plot all points (per. 1-6) on a graph. “Percent change in mass as a function of solute concentration”. Draw a regression line to represent the data (use the Average to do this).
- Determine the solute concentration of the potato from your graph by interpolating from the point where the regression line intersects zero (the concentration where the change in mass was zero).
- What is the concentration of sucrose solution that is isotonic to the cells? \_\_\_\_\_ M sucrose
- Determine whether each of the six solutions are hypo-, iso-, or hypertonic to the cells in the potato.

**Conclusion:**