Passive Transport

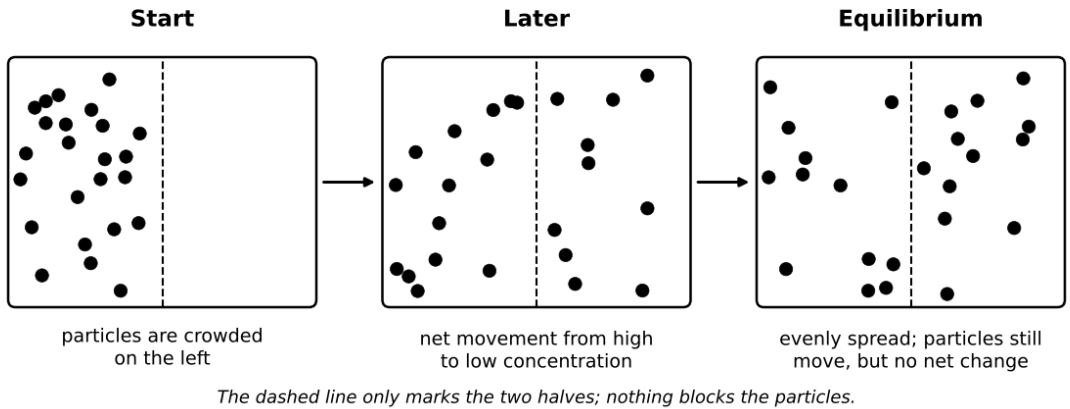
Essential Question

How do substances cross the membrane without using energy?

Passive Transport

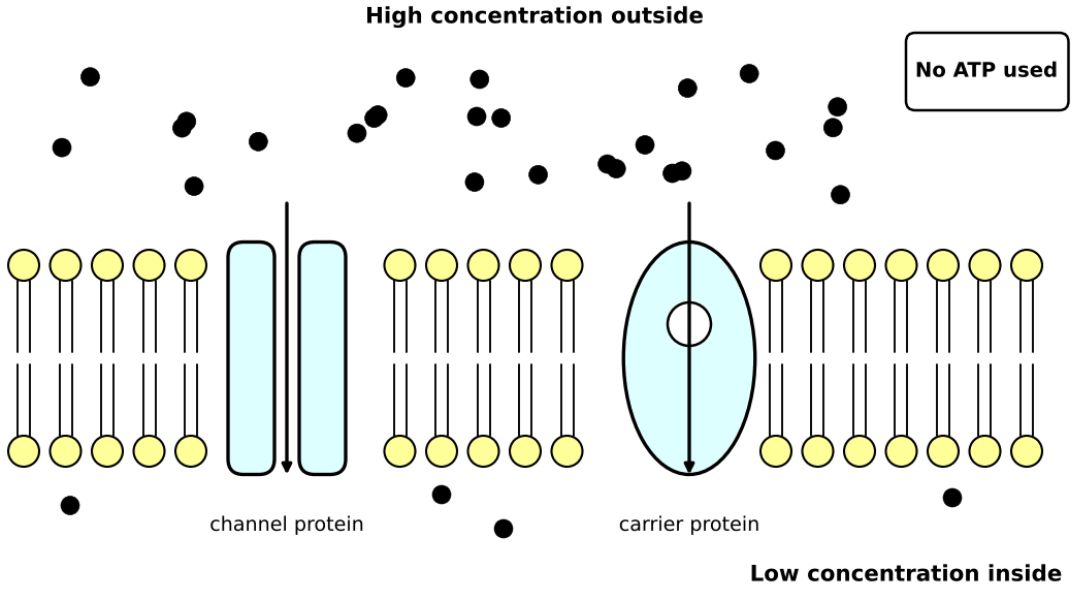
Diffusion

- Particles move randomly all the time
- Net movement is from high to low concentration
- No energy from the cell is needed
- At equilibrium, there is no net movement



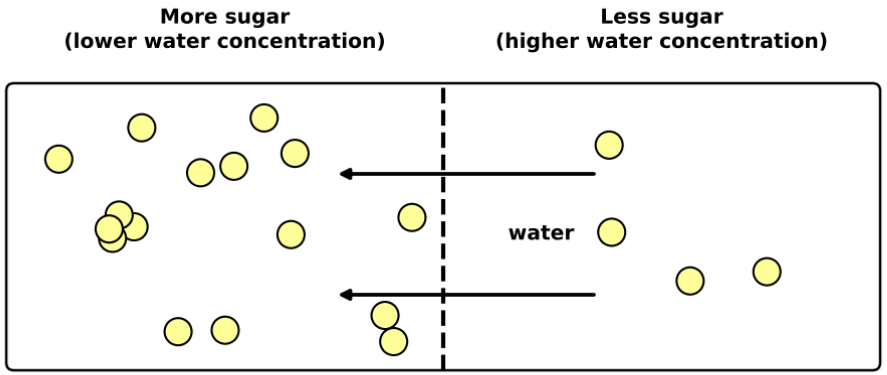
Facilitated Diffusion

- Ions and polar molecules cannot cross the lipids
- Channel and carrier proteins help them cross
- Movement is still down the gradient
- No ATP is used



Osmosis

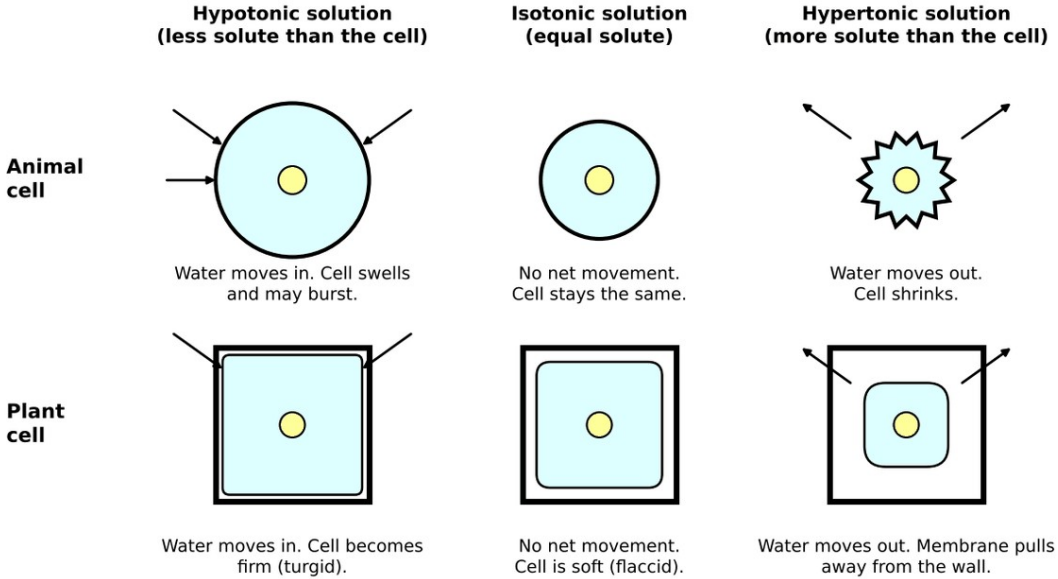
- Osmosis is the diffusion of water across a membrane
- Water moves toward the side with more solute
- Solute cannot cross, so water moves instead
- It continues until the concentrations are equal or pressure stops it



The membrane lets water through but not sugar (the circles).
Net water movement is toward the side with more solute.

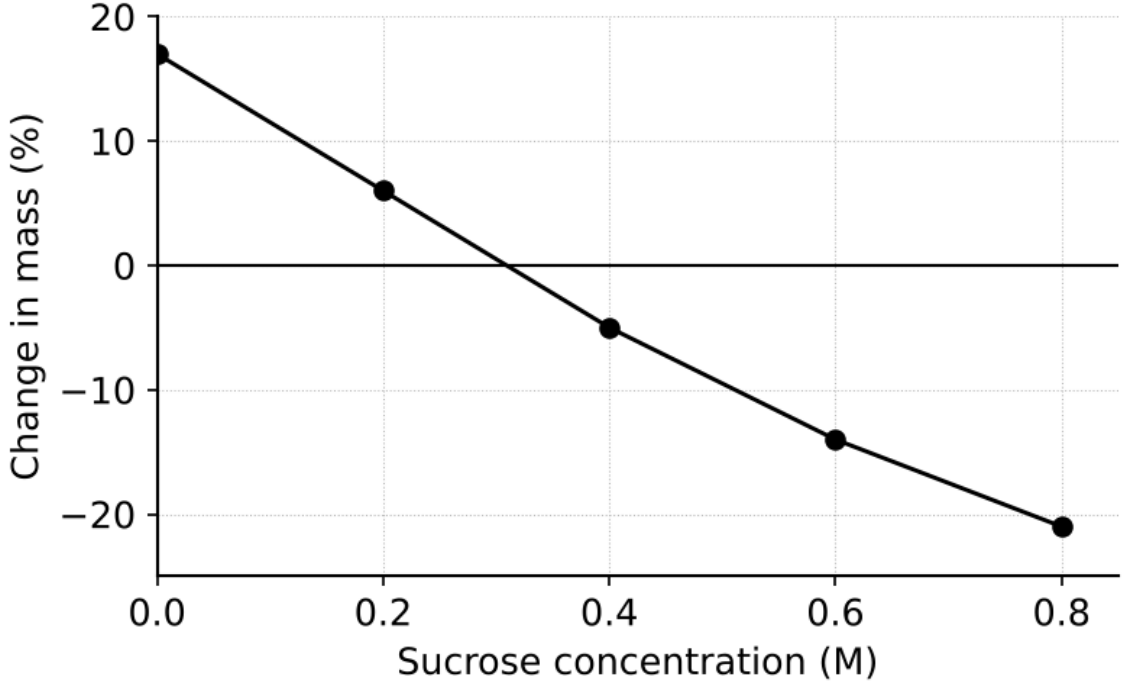
Cells in Different Solutions

- Hypotonic: less solute than the cell, water moves in
- Isotonic: equal solute, no net movement
- Hypertonic: more solute than the cell, water moves out
- A cell wall keeps plant cells from bursting



Measuring Osmosis

- Soak potato cores in different sucrose solutions
- Find the percent change in mass of each core
- Gain means water entered; loss means water left
- No change estimates the isotonic concentration



Example: Percent Change in Mass

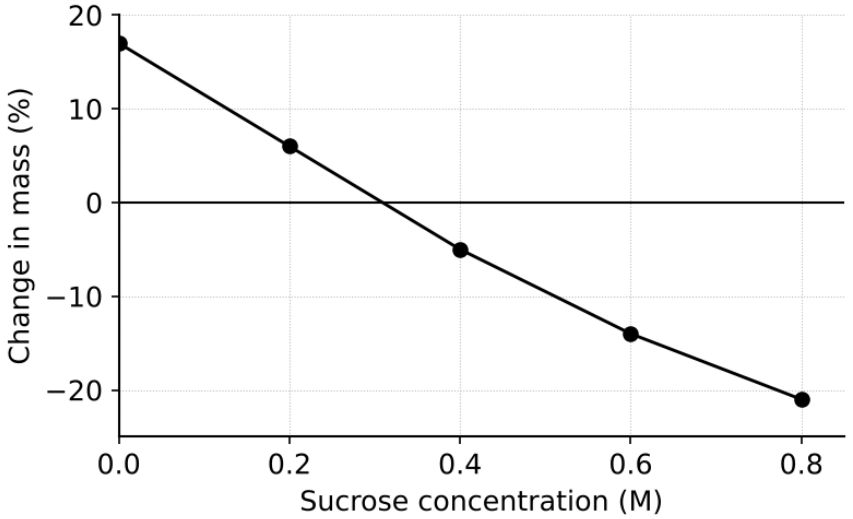
A potato core with a starting mass of 2.40 g is soaked in distilled water for 24 hours and then weighs 2.76 g. A second core, also 2.40 g, is soaked in 0.6 M sucrose and then weighs 2.07 g. Find the percent change in mass of each core and say which way water moved.

Core	Start mass (g)	End mass (g)
Distilled water	2.40	2.76
0.6 M sucrose	2.40	2.07

Example: Find the Isotonic Point

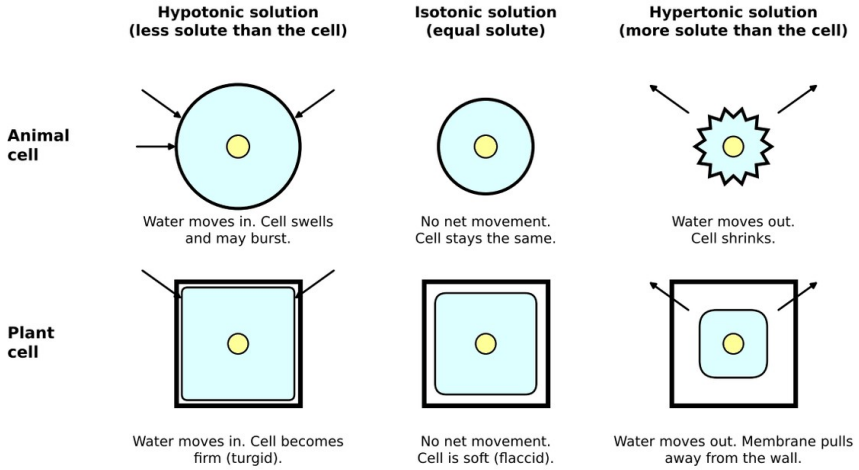
Potato cores of equal mass were soaked in sucrose solutions (sample data). Estimate the concentration at which the mass would not change. Write a claim, evidence, and reasoning.

Sucrose (M)	Start mass (g)	End mass (g)	Change (%)
0.0	2.00	2.34	+17.0
0.2	2.00	2.12	+6.0
0.4	2.00	1.90	-5.0
0.6	2.00	1.72	-14.0
0.8	2.00	1.58	-21.0



Example: Predict the Water Movement

A red blood cell contains about 0.9% solutes. It is placed in a salt solution that is 3% solutes. Use the model to predict which way water moves and what happens to the cell.



Passive Transport

Big Ideas

- Diffusion moves particles from high to low concentration without ATP
- Facilitated diffusion uses channel and carrier proteins and is still passive
- Osmosis is the diffusion of water; water moves toward more solute
- Hypotonic, isotonic, and hypertonic solutions predict how cells change
- Percent change = (final - initial) / initial x 100