

Osmosis



Learning Targets:

- Predict the effect of osmotic solutions on plant and animal cells.
- Compare and contrast different types of passive transport.

Background Information

- Cells are constantly subjected to the flow of water across their membrane because they CANNOT control it.
- Water is small, fast, and everywhere in a cell's environment.

How does water enter and leave a cell?

Osmosis: The diffusion of water across a membrane.

- a special kind of diffusion (only for water)

What are the different types of osmotic solutions?



Hypertonic: more water **inside** of the cell.



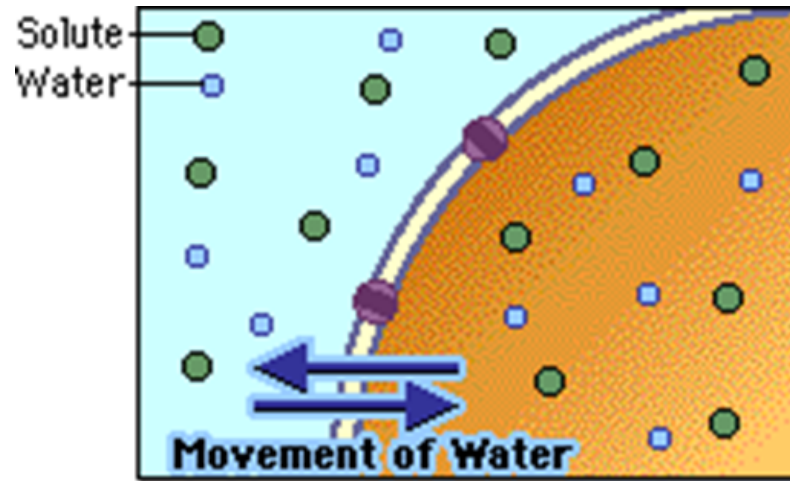
Isotonic: even amount of water inside and outside the cell.



Hypotonic: more water **outside** of the cell.

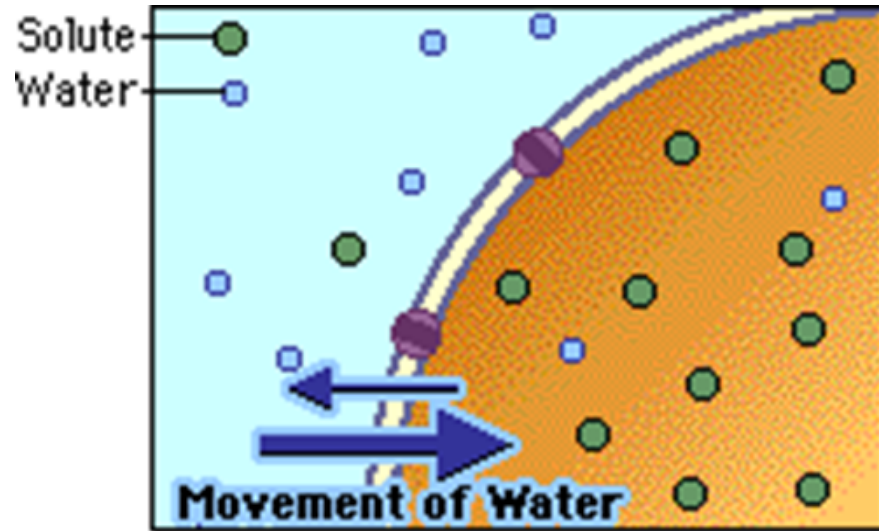
What is isotonic?

- When the concentration of water is the same inside and outside the cell (equilibrium).
 - Water moves equally in and out of cells.
 - *No change in the size of the cell.*



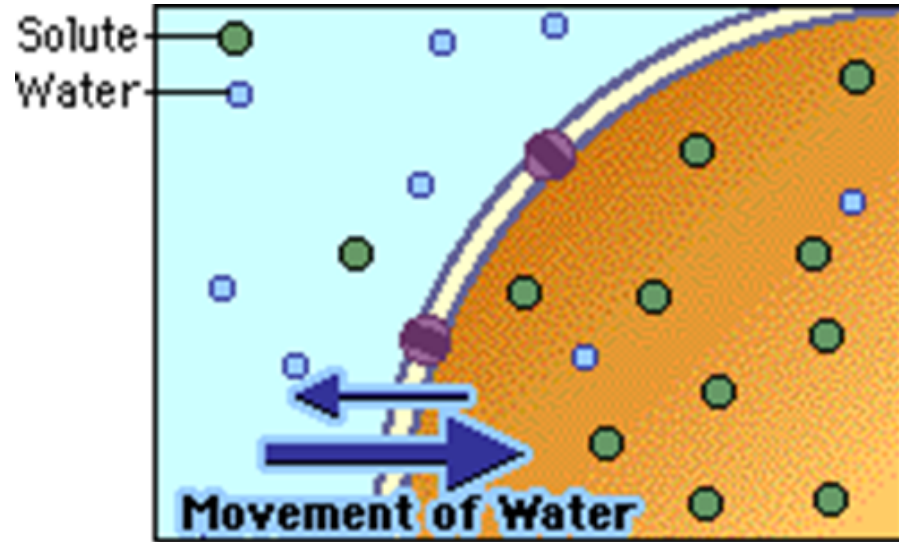
↓ What is hypotonic?

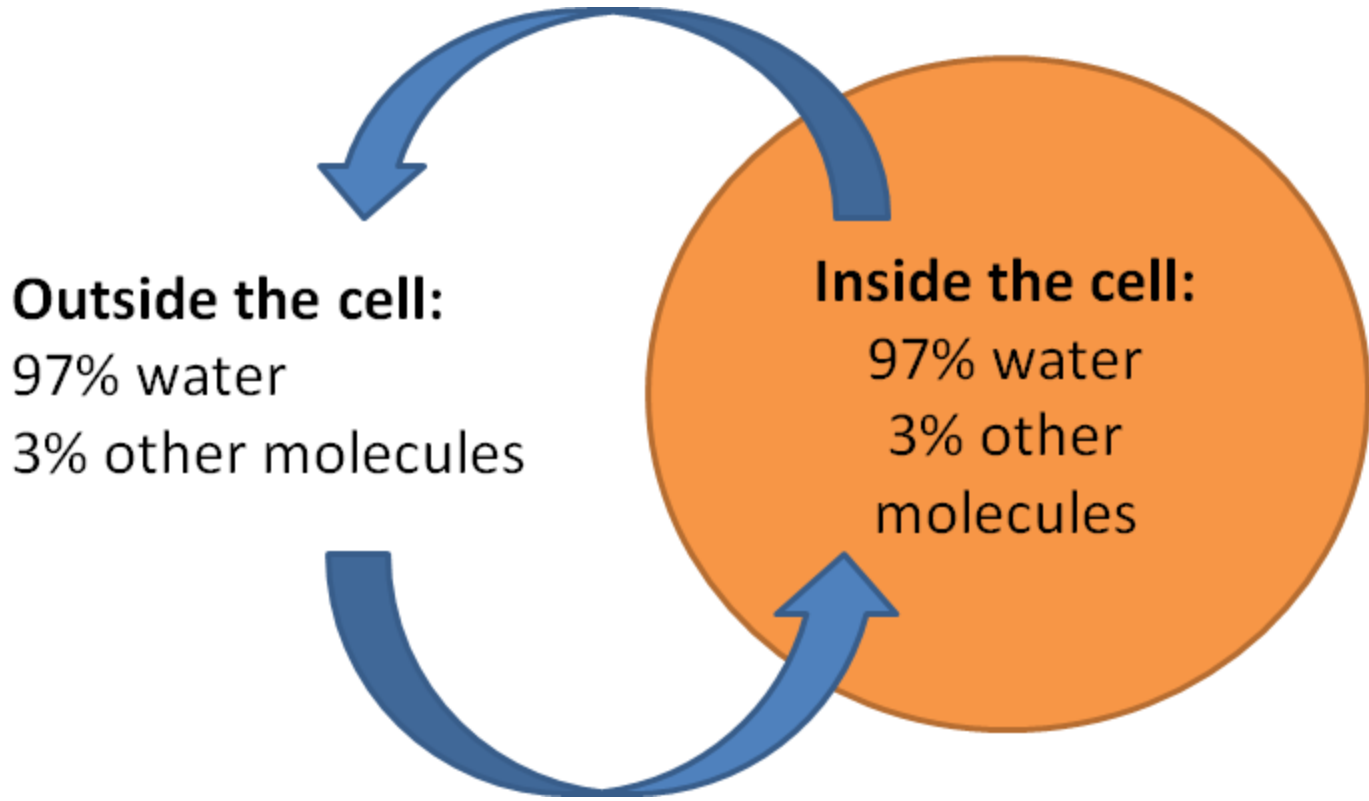
- When the concentration of water is greater **OUTSIDE** the cell (less solutes outside).
 - Net water movement into the cell.
 - *Cell gains water and swells.*



↑ What is hypertonic?

- When the concentration of water is greater **INSIDE** the cell (more solutes outside).
 - Net movement of water is **OUT** of the cell.
 - *Cells lose water and shrink.*





Outside the cell:
97% water
3% other molecules

Inside the cell:
97% water
3% other molecules

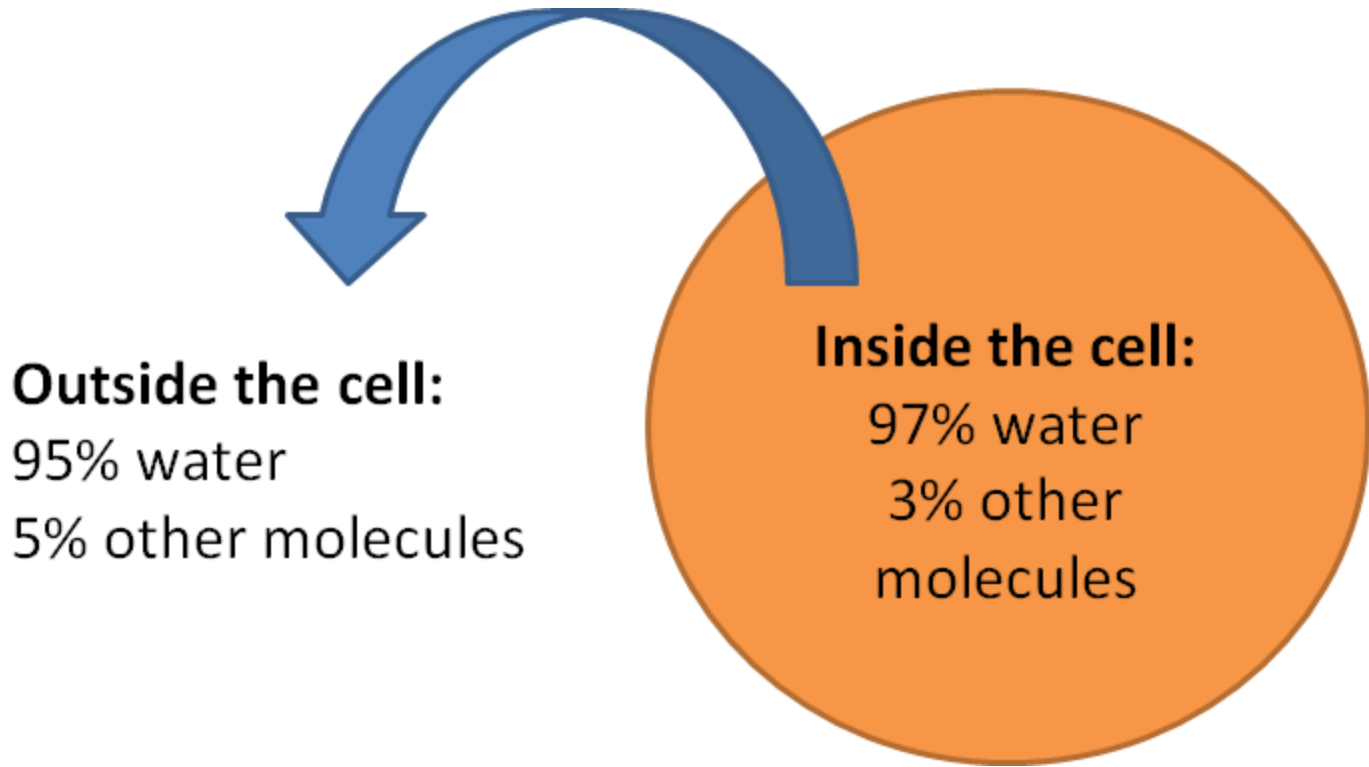
There is the same amount of water INSIDE and OUTSIDE of the cell, so the solution is **ISOTONIC**. There is no NET movement of water. There is no change in cell shape.

Outside the cell:
99% water
1% other molecules

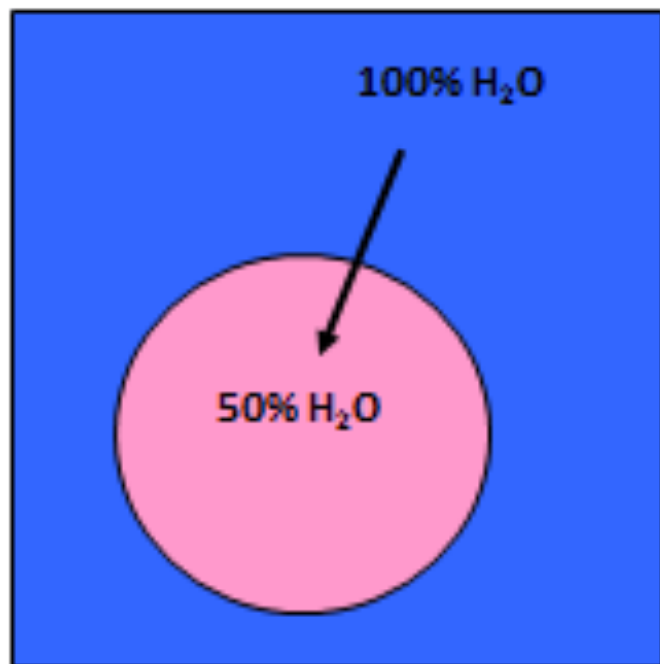
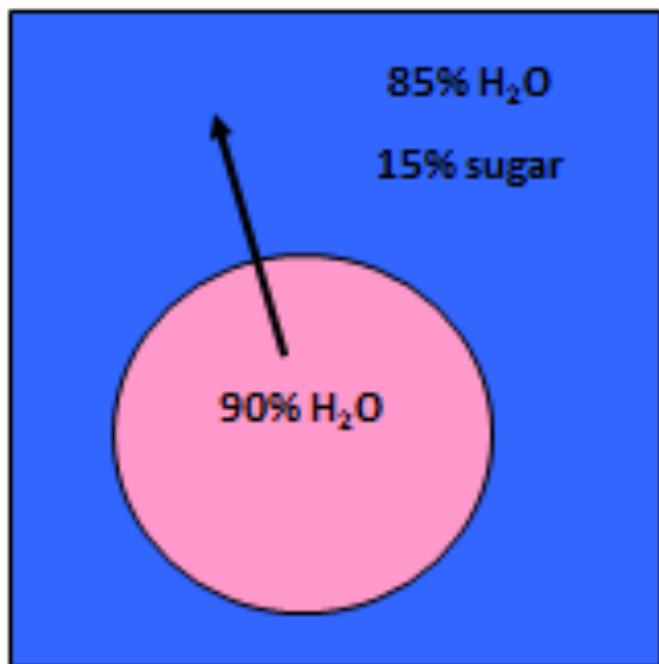


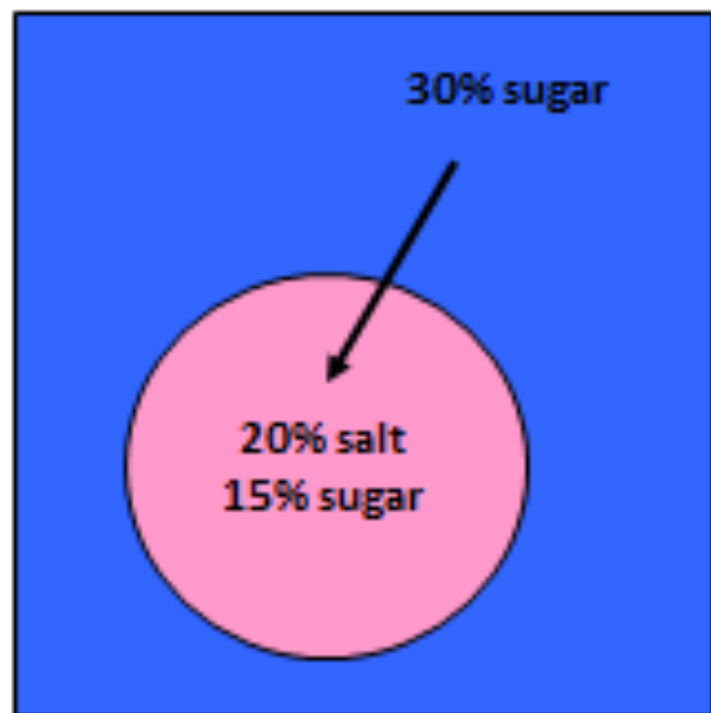
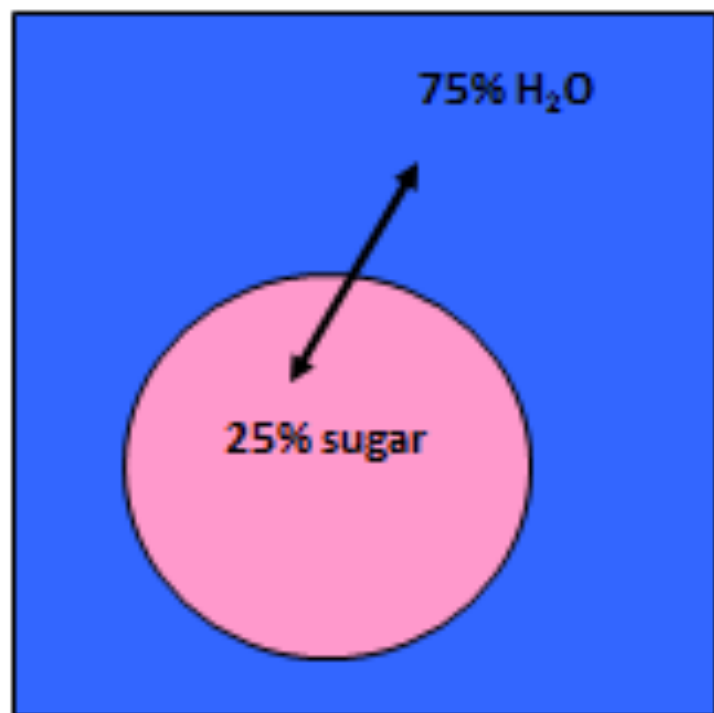
Inside the cell:
97% water
3% other molecules

There is more water **OUTSIDE** of the cell, so the solution is **HYPOTONIC**. Water will move **INTO** the cell and its size will get larger.

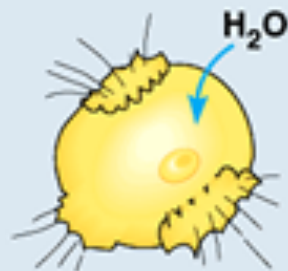


There is more **INSIDE** of the cell, so the solution is **HYPERTONIC**. Water will move **OUT** of the cell and its size will shrink.



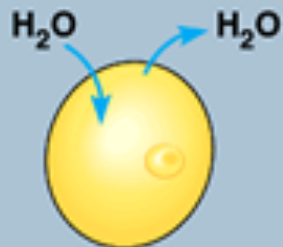


Hypotonic solution



Lysed

Isotonic solution



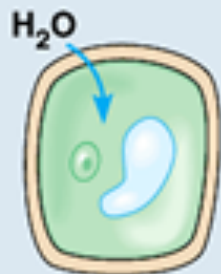
Normal

Hypertonic solution

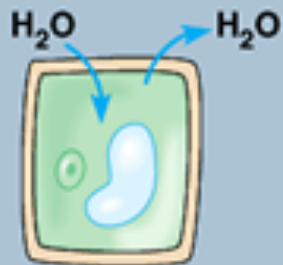


Shriveled

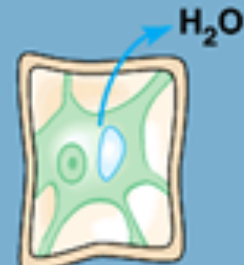
Animal cell



Turgid (normal)



Flaccid



Plasmolyzed

Plant cell