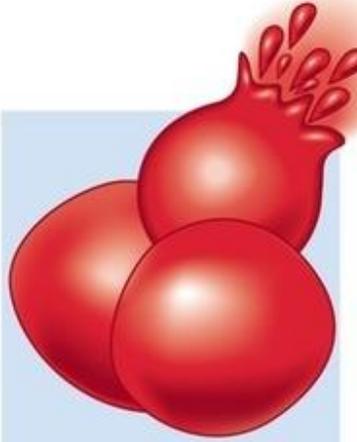
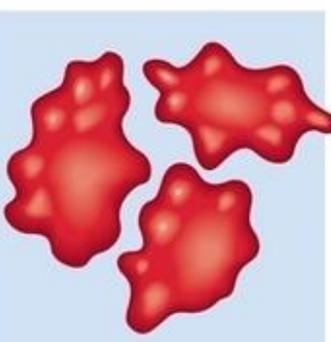


Red blood cells

 normal cells	 cells swell, burst	 shriveled cells
Isotonic solution	Hypotonic solution	Hypertonic solution

A Normal Red Blood Cell
Concentration of water inside the cell is the same as outside.

B Low Water Concentration Outside Cell
Water moves out of the cell during osmosis.

C High Water Concentration Outside Cell
During osmosis, water moves into the cell.

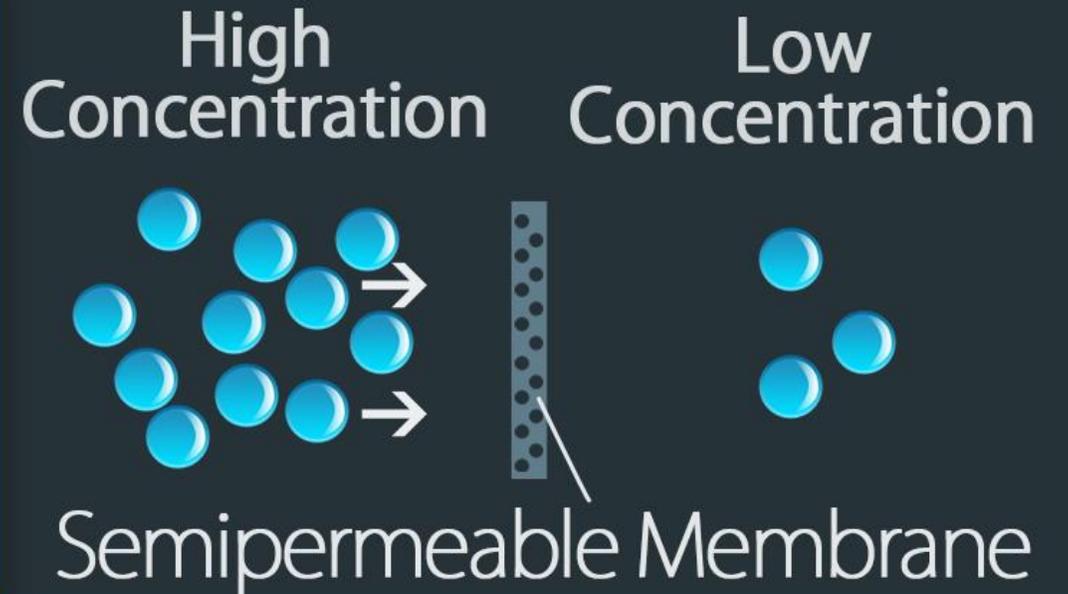
Labels: Water molecules, Cell membrane

Diffusion vs. Osmosis

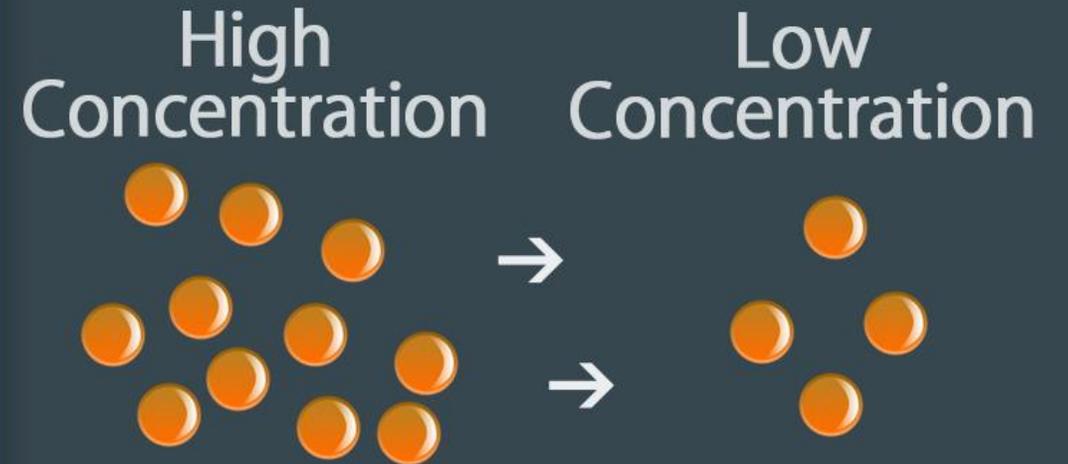
Remember the **concentration gradient**!

Solute molecules in solution behave the same way when a membrane is not involved.

OSMOSIS
Water Molecules



DIFFUSION
Air Molecules



How is solute concentration (osmolarity) created?

Solvent: liquid/substance that the solute dissolves in (usually water in living organisms)

Solute: the molecule/particle that is dissolved in the solvent

Solution: the combination of a solvent and solute(s). When the solute is dissolved in water, we call it an aqueous solution.

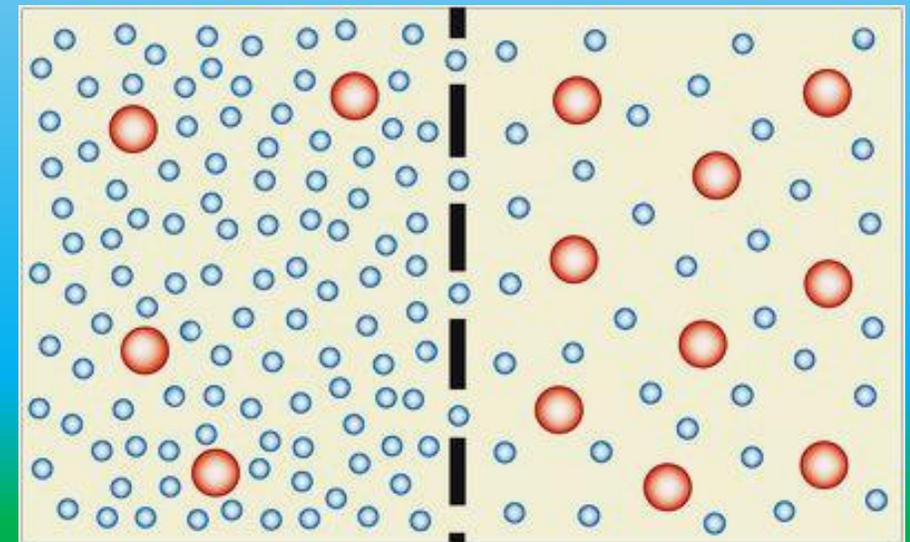
Short Quiz:

Which item below is the solvent and which is the solute?

Salt water

Black coffee

Black coffee with sugar
(yuck... to the sugar part.)



Osmolarity → a measure of the concentration of a solution. Measured in the number of solute particles per liter of solution (ppL)



% H₂O + % dissolved solute = 100%

Tonicity → used to compare the osmolarity of a cell to the osmolarity of the extracellular fluid around it.

- Hypertonic = higher solute conc.
- Isotonic = equal solute conc.
- Hypotonic = lower solute conc.

Example: 15% NaCl, 85% H₂O cell is placed in a 100% H₂O solution, what will happen? Think cucumber thoughts!



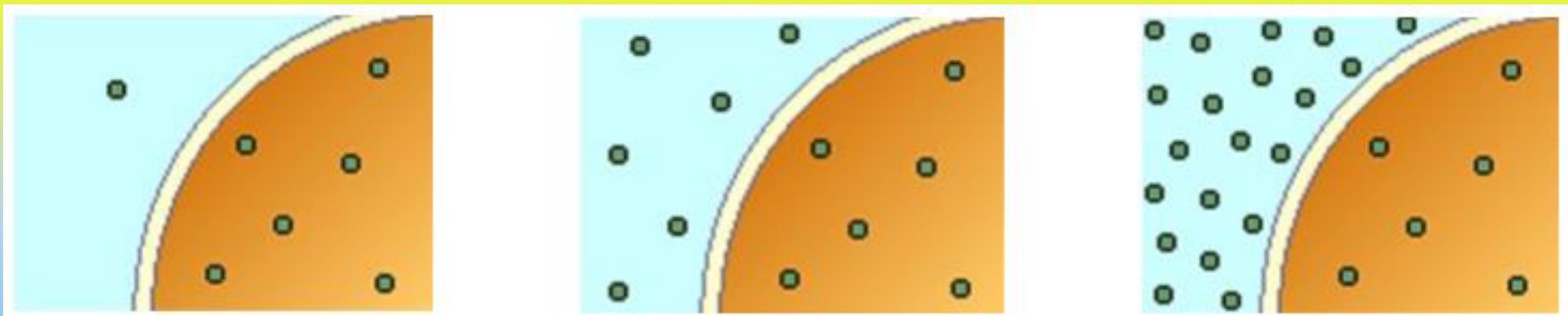
Cell's behavior (response to concentration gradient)

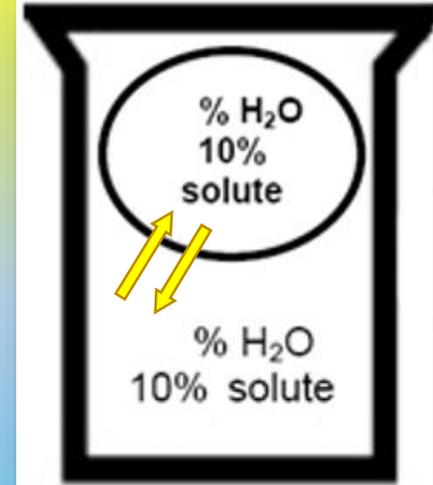
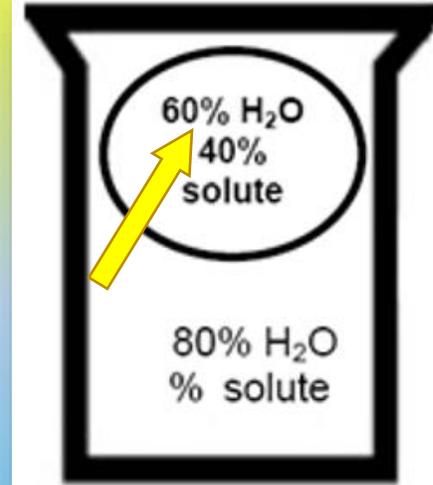
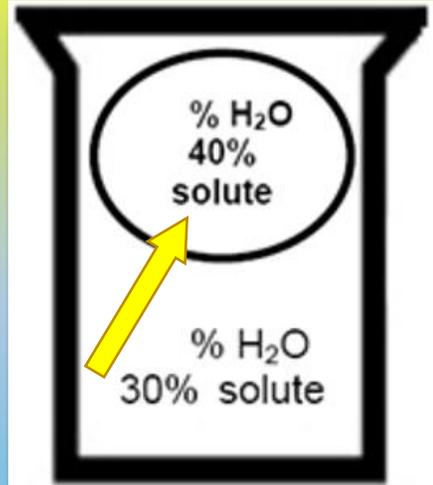
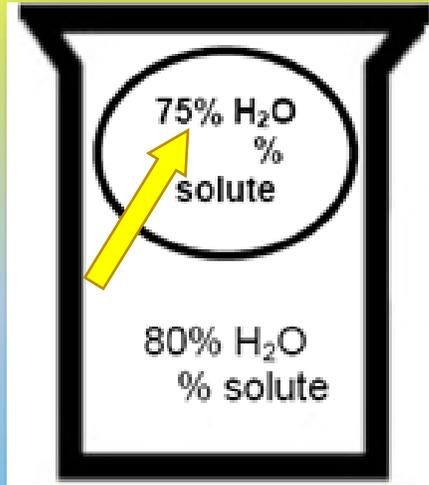
- Swell (lyse vs. turgid)
- Remain the same
- Shrink (crenate vs. plasmolyze)

Isotonic: occurs when the **concentrations of two solutions are the same**. Cells placed in an isotonic solution retain the same mass, neither gaining nor losing water, but the molecules are still moving. The cell will remain normal, or the same.

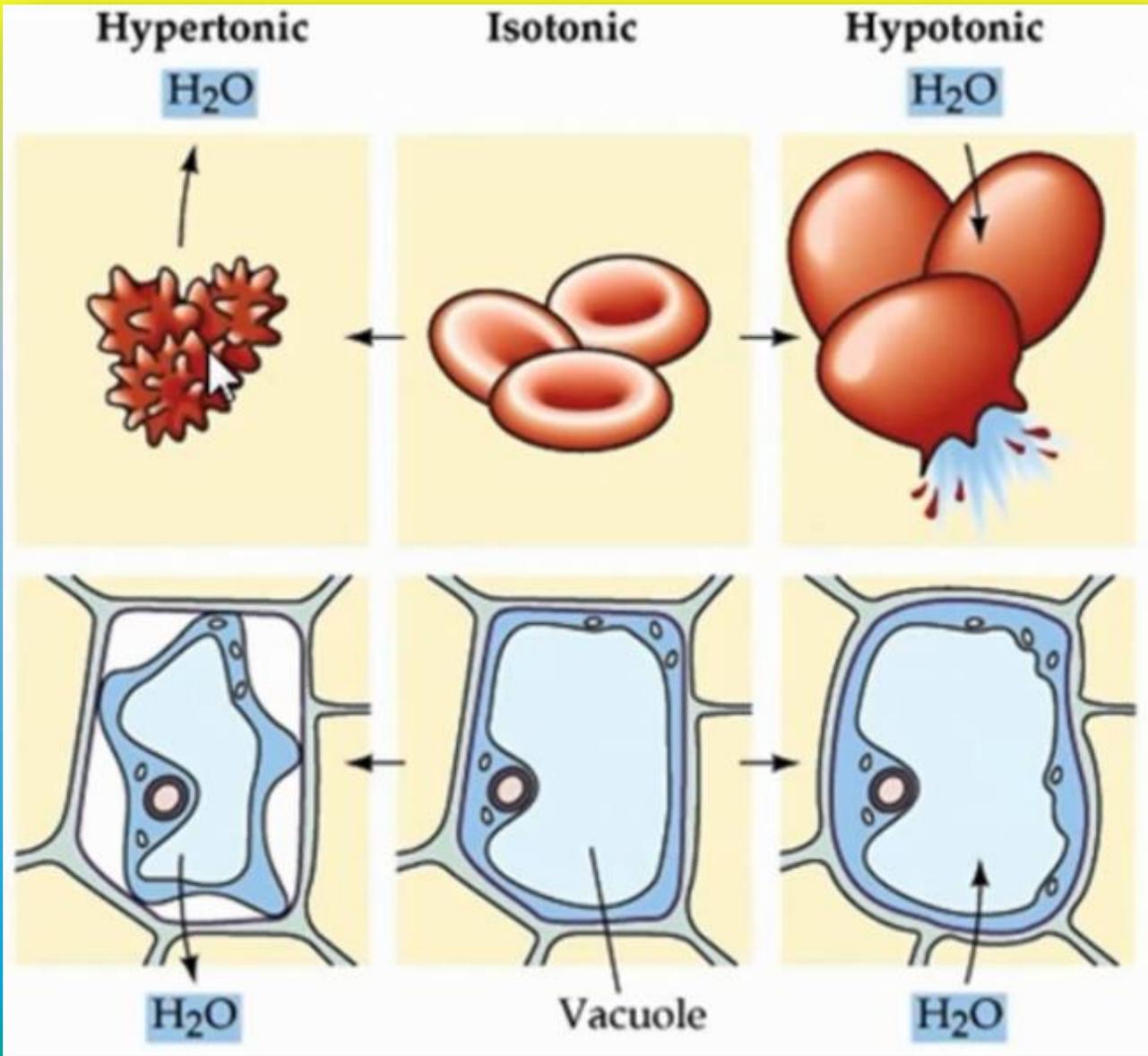
Hypertonic refers to a **solution that has a higher concentration of solutes than the cell placed in it**. If an animal cell is placed in a hypertonic solution, **water will move out** of the cell causing it to **shrink, resulting in a crenated animal cell or a plasmolyzed plant cell**.

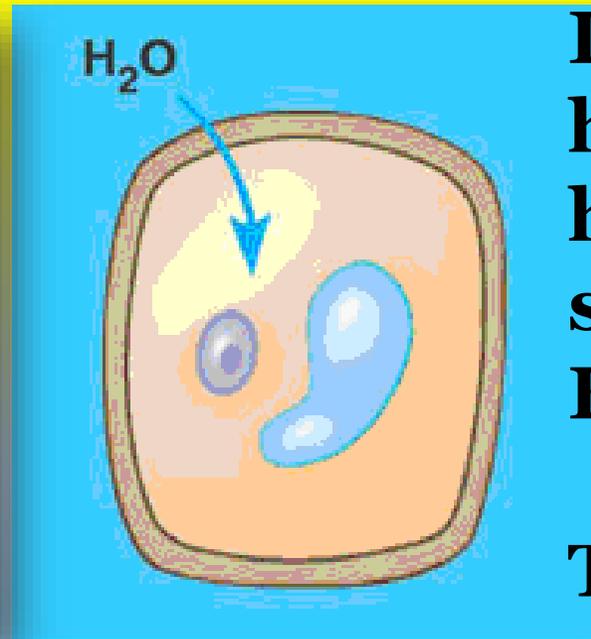
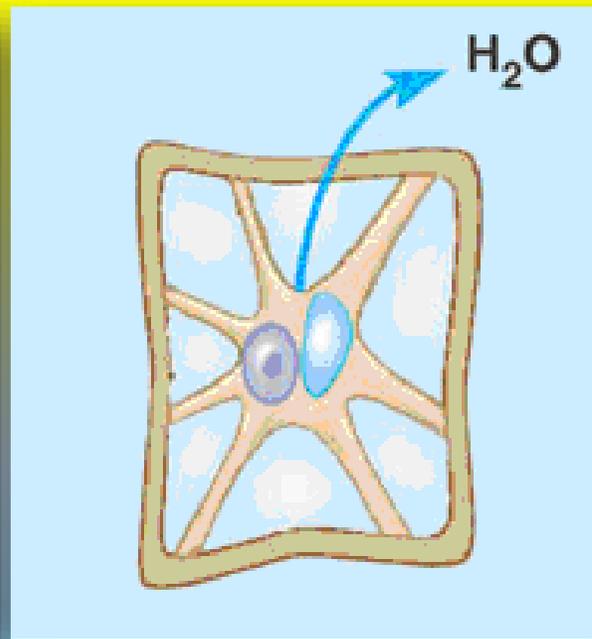
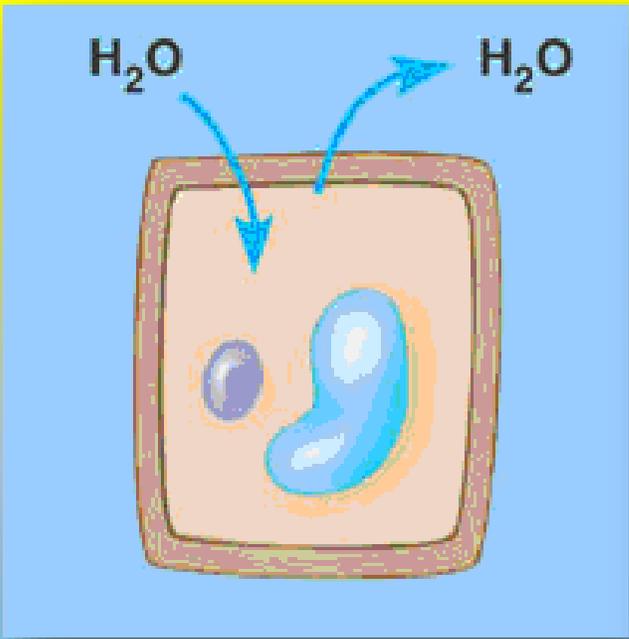
Hypotonic refers to a **solution with a lower concentration of solutes than the cell placed in it**. If an animal cell is placed in a hypotonic solution, **water will move into** the cell causing it to **swell and burst (turgidity for plants, lysis for animals)**.



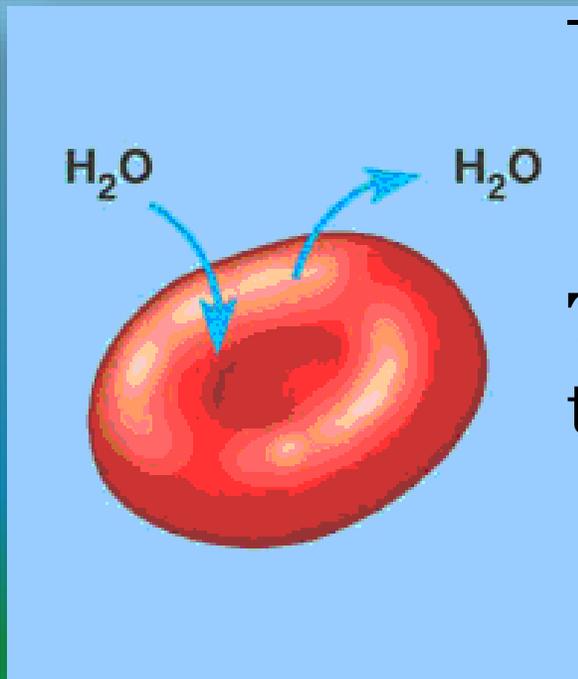
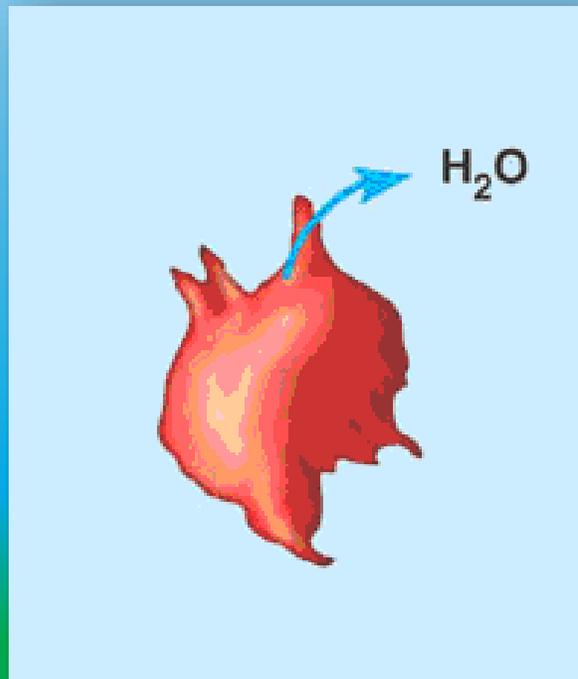


**Arrows help us
show the direction
water moves.**





**Isotonic, hypertonic, or hypotonic solution?
How to use them:
The solution is _____ to the cell,**



**Or
The cell is ____ to the solution.**