

## Diffusion

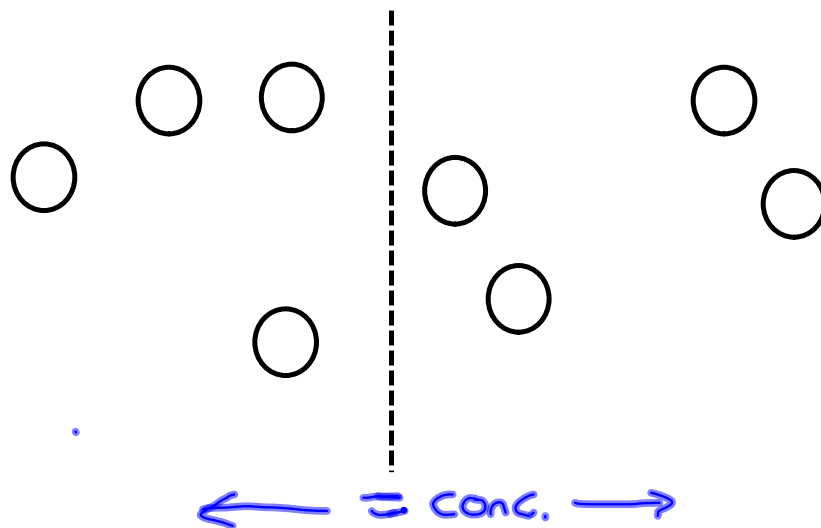
- The net movement of particles from an area where there are many particles of a substance to an area where there are fewer particles of a substance

High concentration → A LOT

Low concentration → A LITTLE

concentration - the amount of a substance in a particular area

\*<sup>\*\*\*</sup> substances diffuse from areas of high concentration to areas of low concentration



ex. perfume, cookies baking, etc

\* dynamic equilibrium - the condition where there is continuous movement of particles but no overall change in concentration

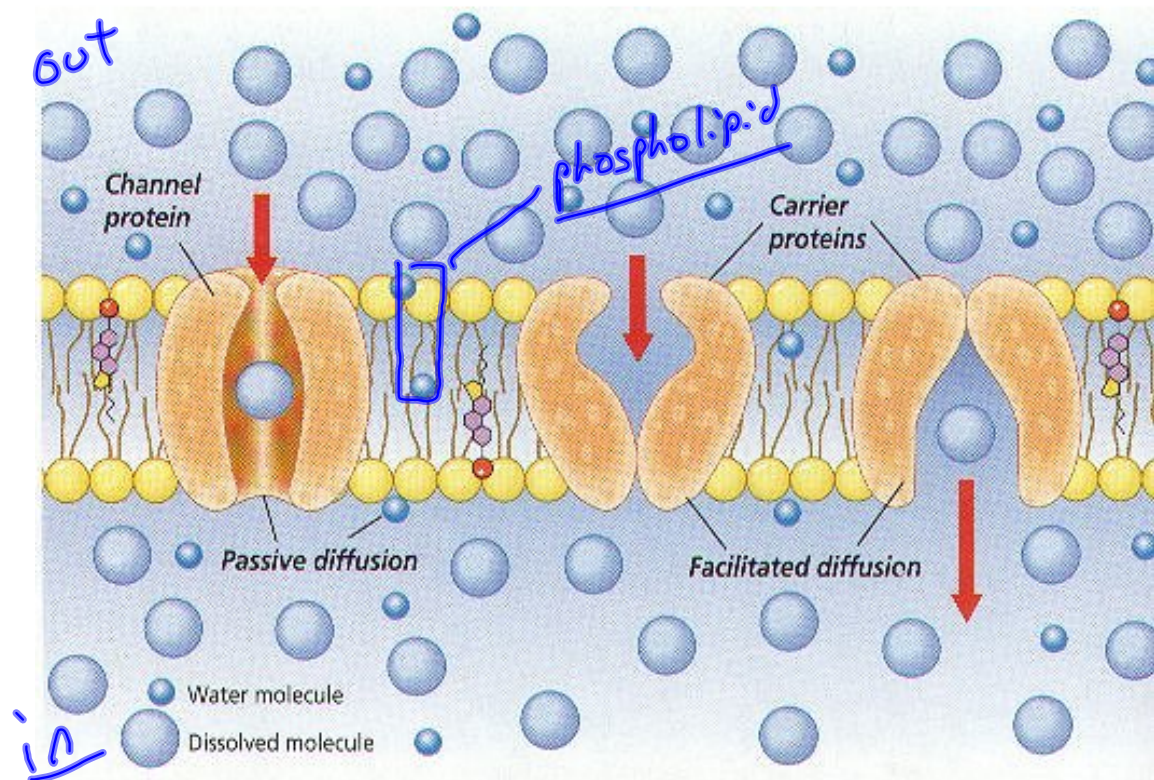
## Diffusion across the plasma membrane

- cells need water, ions, and other molecules to help the cell function
- water can diffuse across the membrane, but other substances cannot

★ Facilitated Diffusion - the use of transport proteins to move ions and other molecules across the cell membrane

★ channel proteins - water filled, opens and closes

★ carrier proteins - change shape as diffusion occurs



## Osmosis

the diffusion of water across a selectively permeable membrane

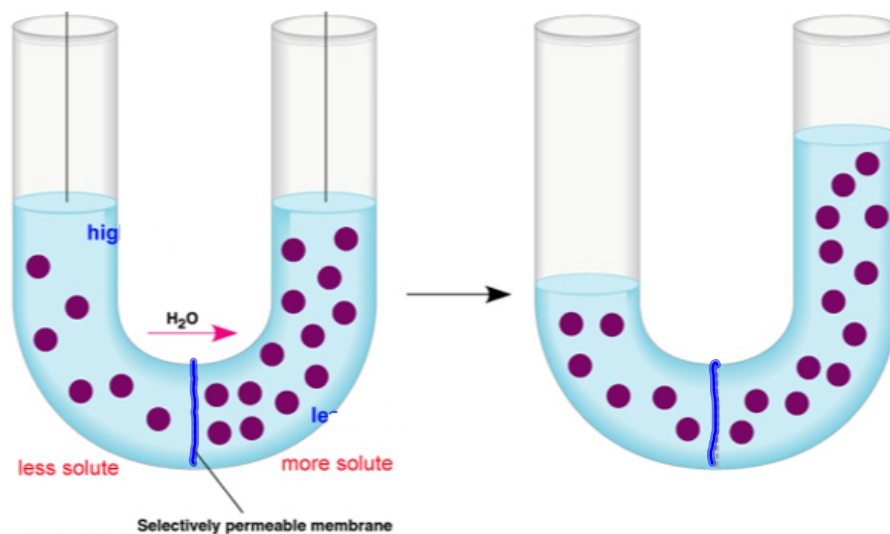
- the regulation of water helps the cell maintain homeostasis

### Solutions

solute = what is dissolved (Kool-aid powder)

solvent = what does the dissolving ( $H_2O$ )

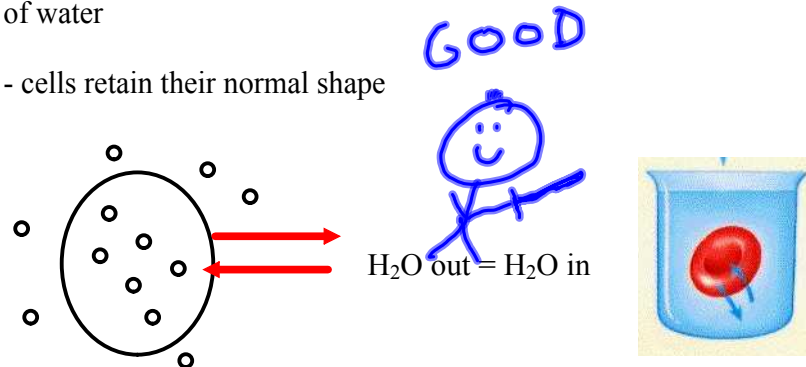
- \* - Water (solvent) will diffuse to the area of greater solute concentration until dynamic equilibrium is reached. Then water will diffuse back and forth but the concentrations will not change



$H_2O$  WANTS TO  
GO TO THE PARTY

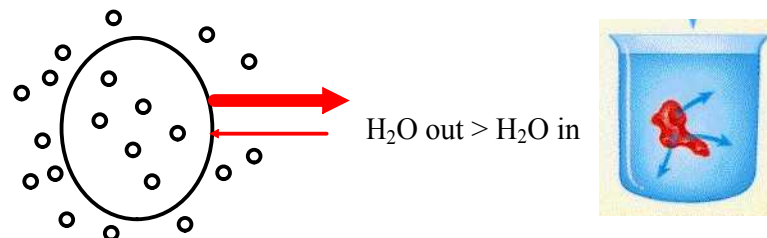
## Isotonic

- when a cell is in a solution that has the same concentration of water and solutes (ions, sugars, proteins, etc) as it does in its cytoplasm
- the cell is at equilibrium with the solution so there is no net movement of water
- cells retain their normal shape



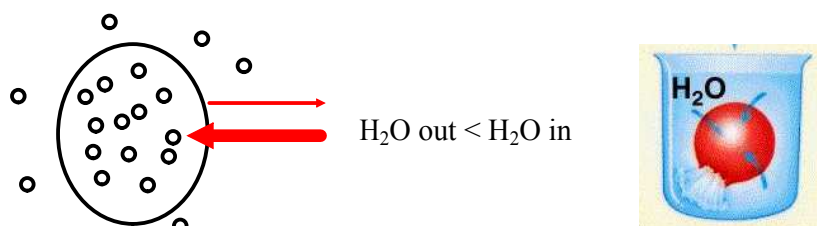
## Hypertonic

- when a cell is in a solution that has more solute outside the cell than it has inside the cytoplasm
- solute outside cell > solute inside cell
- $H_2O$  will diffuse to area of higher solute concentration
- $H_2O$  leaves the cell and the cell shrivels



## Hypotonic

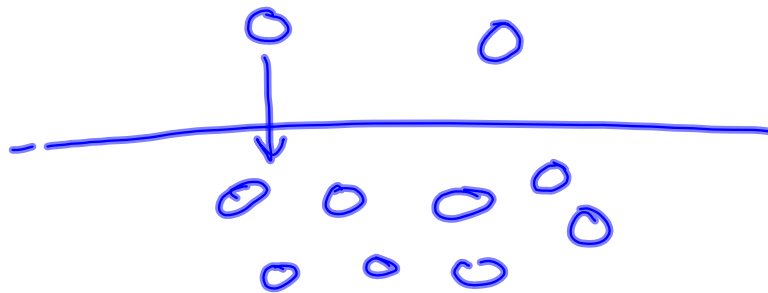
- when a cell is in a solution that has less solute outside the cell than it has inside the cytoplasm
- solute outside cell < solute inside cell
- $H_2O$  will diffuse to area of higher solute concentration
- $H_2O$  enters the cell and the cell swells up and eventually bursts



- diffusion and osmosis take place without the input of outside energy. This is said to be PASSIVE TRANSPORT \*

- sometimes substances move from an area of low concentration to an area of high concentration. This is against the natural flow. This type of movement requires outside energy. This type of transport is \* ACTIVE TRANSPORT \*

↓  
takes place with the help of carrier proteins also called pumps



## Sodium-Potassium ATPase pump or

$\text{Na}^+/\text{K}^+$  ATPase Pump

Active  
transport

- this pump maintains the level of sodium ions ( $\text{Na}^+$ ) and potassium ions ( $\text{K}^+$ ) inside and outside the cell
- pump uses energy to transport 3 sodium ions out of the cell while moving 2 potassium ions inside the cell.
- The high level of sodium outside the cell creates a concentration gradient.
  - low concentration of Na inside cell, high concentration outside
- Na re-enters the cell and it brings with it sugar and other substances

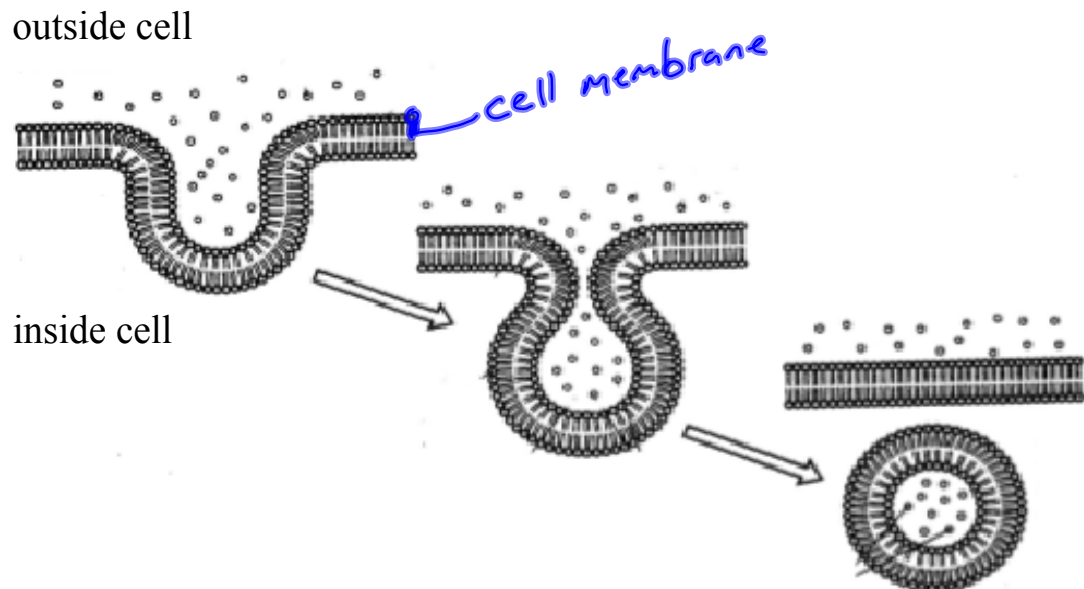
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## Transport of Large Particles

### Endocytosis

- the process by which a cell surrounds a substance in the outside environment enclosing the substance in a portion of the plasma membrane. The membrane then pinches off leaving the substance inside the cell



### Exocytosis

- the secretion of materials at the plasma membrane

- cells use exocytosis to get rid of wastes and secrete substances such as hormones.

