

# **MOVEMENT OF MOLECULES ACROSS CELL MEMBRANES**

# Selectively permeable membrane

- Phospho-lipid Bilayers
- Only allow certain substances in and out
- Occur as cell membrane & Nuclear membrane

# THREE METHODS

1) Diffusion

2) Osmosis

3) Active Transport

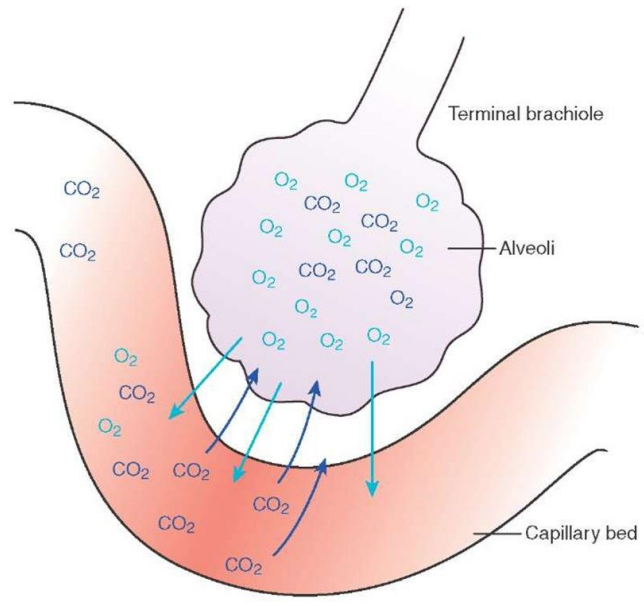
# 1. Diffusion

- **Diffusion** is the movement of molecules (liquid or gas) from an area of high concentration to an area of lower concentration.
- Diffusion is a passive process, requiring no energy.

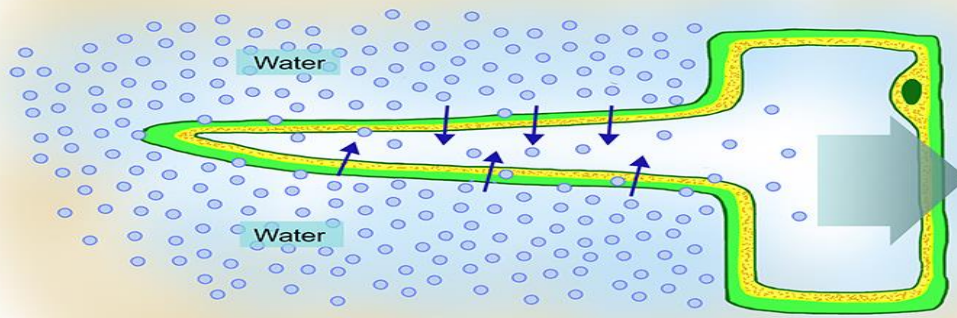
# Examples of Diffusion

- Smell of perfume
- A stink bomb!!
- Oxygen diffusing from the blood into the alveoli and carbon dioxide diffusing out of alveoli into blood-

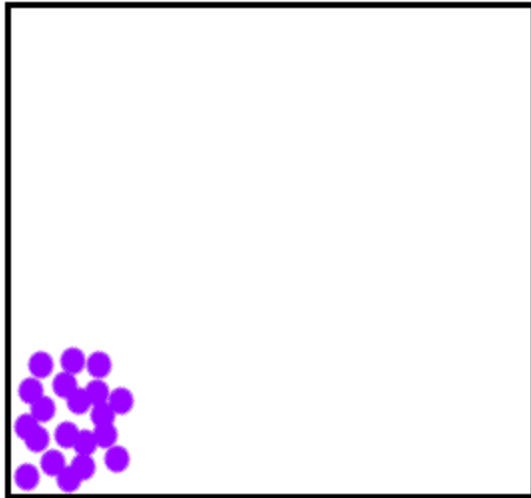




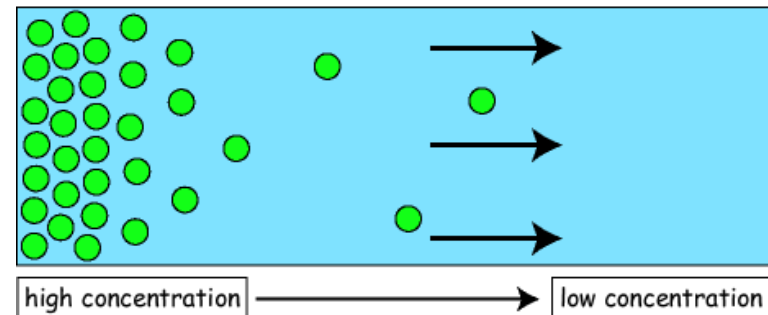
### Root hair cell



# Diffusion



## Diffusion

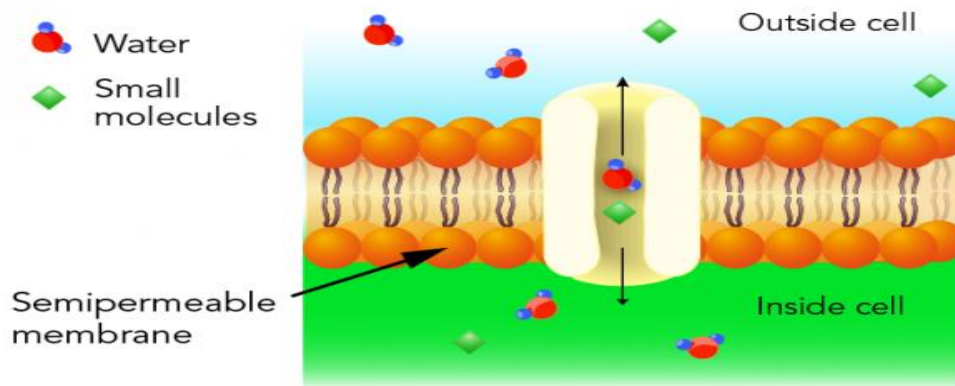


● solute

Solute transport is from the left to the right; movement of the solutes is due to the concentration gradient ( $dC/dx$ ).

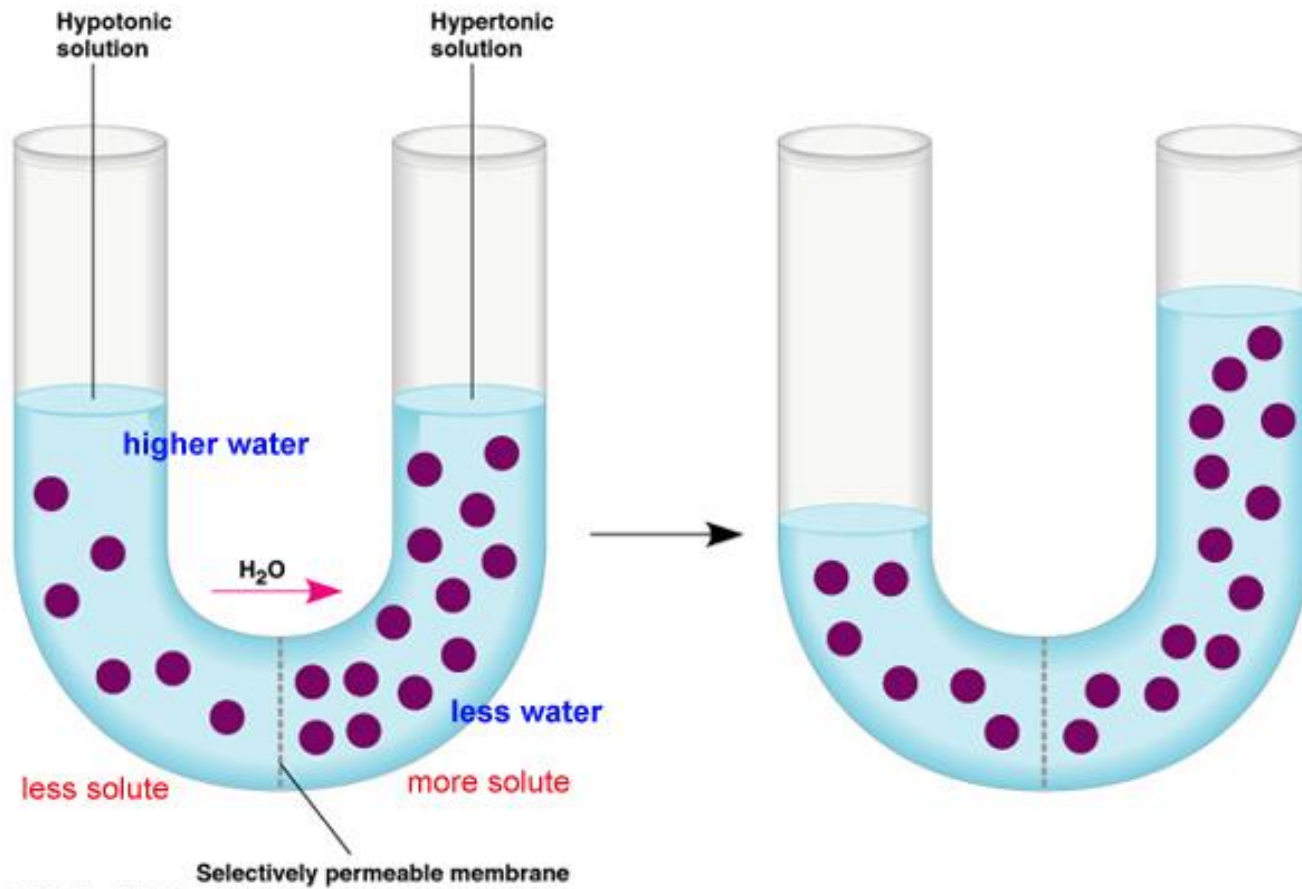
## 2. Osmosis

- **Osmosis** is the movement of ***water*** from an area of high water concentration to an area of low water concentration across a ***semi-permeable membrane***.



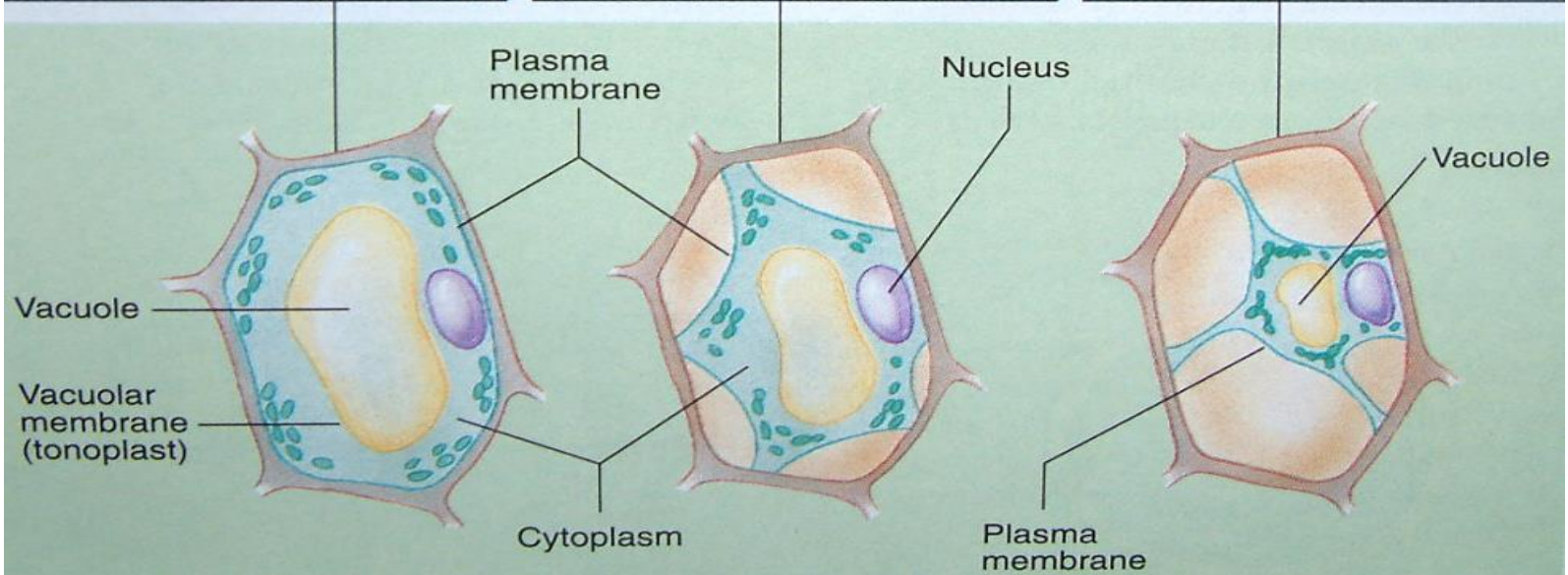
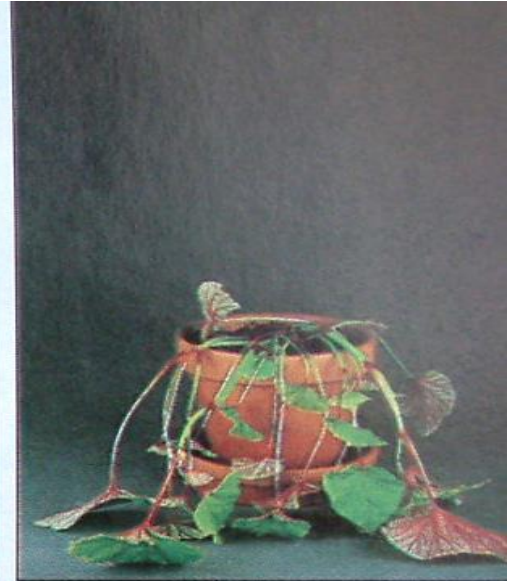
- Osmosis is a passive process and does not require energy.



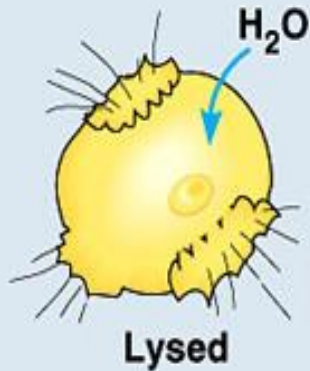


# Concentrations

- **Hypertonic**- A solution that has a higher concentration  
(has less.....)
- **Hypotonic**- A solution that has a lower concentration (has more.....)
- **Isotonic**- Describes two solutions that have the same concentration

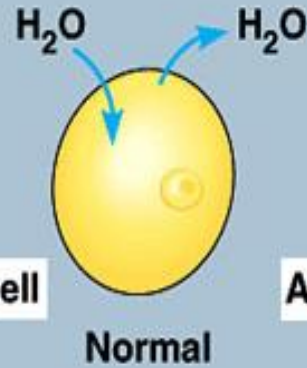


**Hypotonic solution**



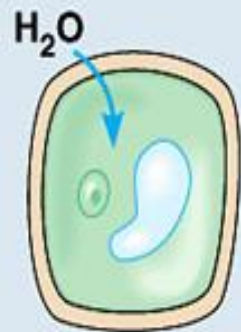
**Animal cell**

**Isotonic solution**

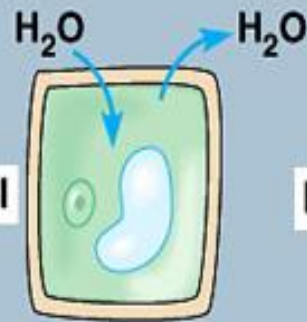


**Animal cell**

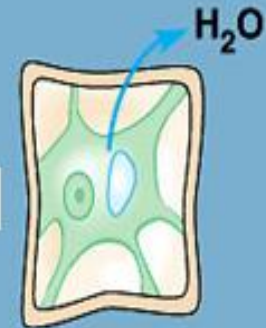
**Hypertonic solution**



**Plant cell**



**Plant cell**



- Turgid- cell that is firm because it is full of water (cell wall allows a plant to remain turgid for long periods of time)
- Turgor benefits plants by keeping them upright and standing tall
- Flaccid- a cell that is floppy because it lacks water- plant eventually wilts
- Lysis- bursting of a cell due to the intake of excess water

# Artificial semi-permeable membranes

- Visking tubing and cellophane are artificial semi-permeable membranes and can be used to demonstrate osmosis.





Gained 0.9g

Lost 3g

Lost 4.3 g

# Food Preservation

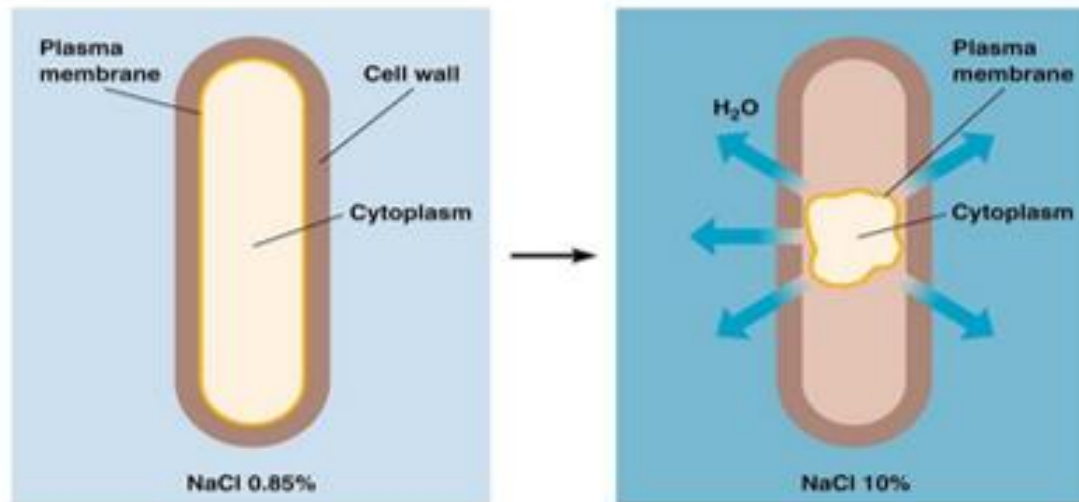
- Food spoilage is caused by bacteria.

To avoid food spoilage:

- Food can be placed in a high solute concentration e.g. sugar or salt solution
- This causes the water inside the food cells and inside the bacteria to leave due to osmosis.
- This dehydration means the bacteria cannot function.



# Examples of food preservation:



# 3. Active Transport

- **Active Transport**-The movement of **molecules** across a cell membrane **against** the concentration gradient i.e. from low concentration to high concentration.
- This process is active and requires energy.
- Cells involved in active transport have high energy requirements and contain many mitochondria.

# Example of active transport:

- Uptake of glucose in villi of small intestine