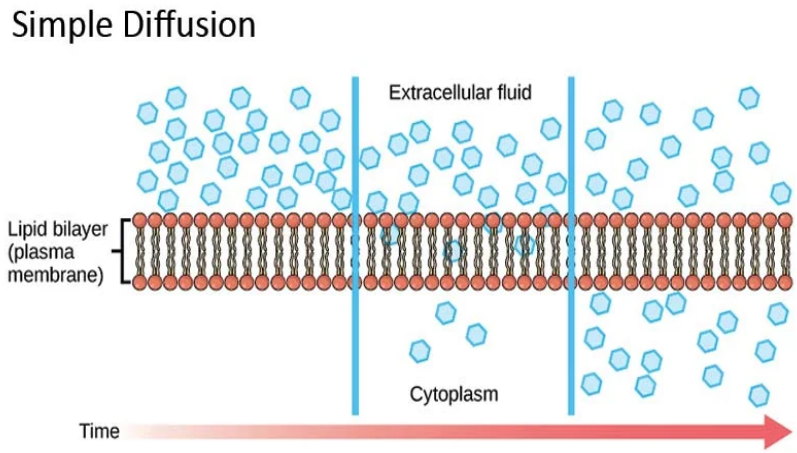
# Movement of particles by Diffusion, Osmosis and Active Transport

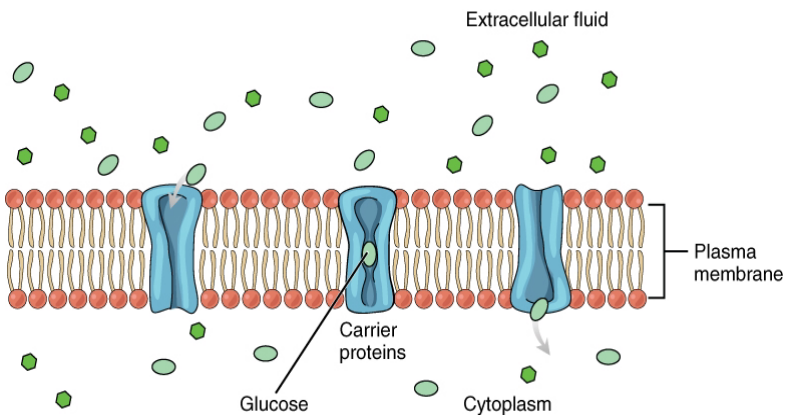
## 1. Diffusion

- **Definition:** Diffusion is the process in which particles move from area of higher concentration to area of lower concentration.
- **Types of Diffusion:**

I- **Simple diffusion:** Movement of particle from higher to lower concentration without help of any protein. E.g Bacteria transport water and other nutrient to cytoplasm.




II- **Facilitated Diffusion:** Movement of particle from higher to lower concentration with the help of carrier molecule ( protein, carbohydrates or lipids) E.g transport of material through cell membrane.



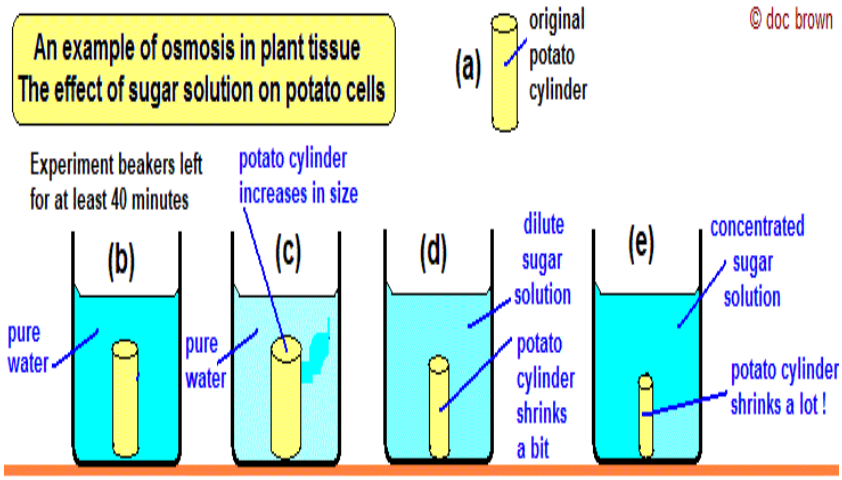
➤ **Factors affecting Diffusion**

There are a few factors that affect the process of diffusion, which individually and collectively alters the rate and extent of diffusion. These factors include:

- **Temperature**: Higher Temp= increase in movement=higher diffusion
- **Surface area**: large surface area= higher rate of diffusion
- **Size of the Particle:** small particle ( oxygen, glucose amino acid and water) easily diffuses where as large molecule( proteins ,carbohydrate etc) can't diffuses through cell membrane

## 2- Osmosis

➤ **Definition:** Osmosis is a process by which the molecules of a solvent( Water molecules) pass from a solution of low concentration to a solution of high concentration through a semi-permeable membrane. E.g in a Sugar solution water is solvent and sugar is solute.

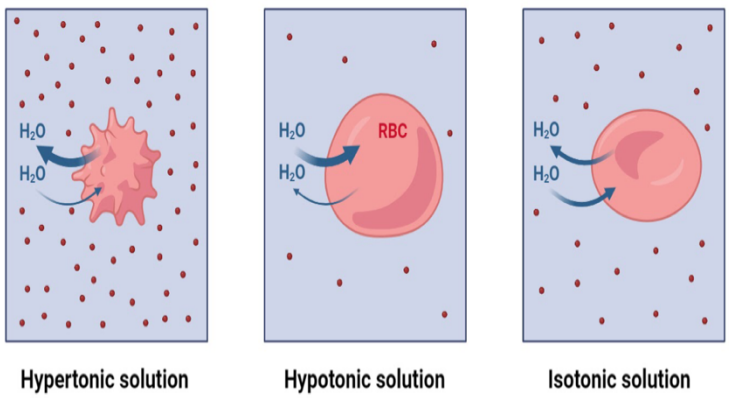



➤ **Osmotic type of Solution:**

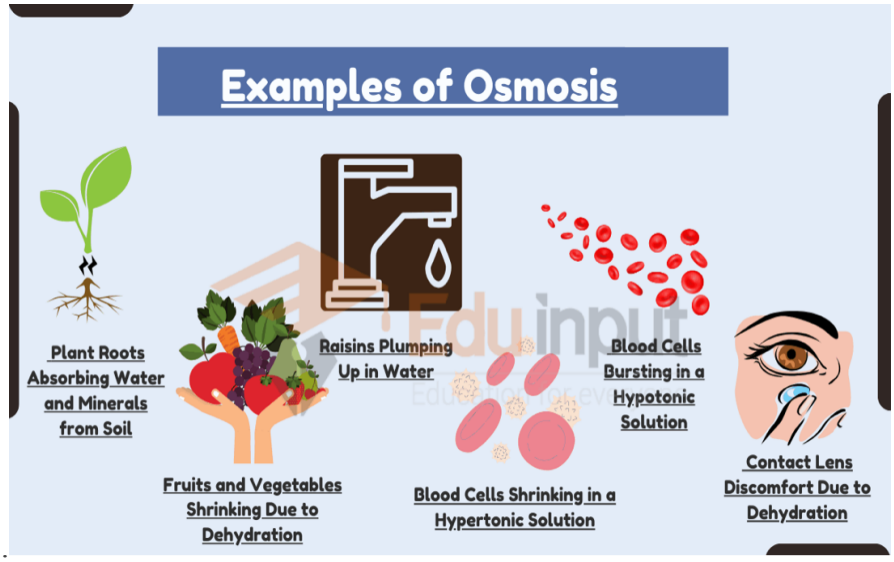
**I- Isotonic**: same concentration of solute of both inside and outside the cell

**II- Hypotonic**: higher concentration of solute inside the cell than outside

**III- Hypertonic**: higher concentration of solute outside the cell than inside

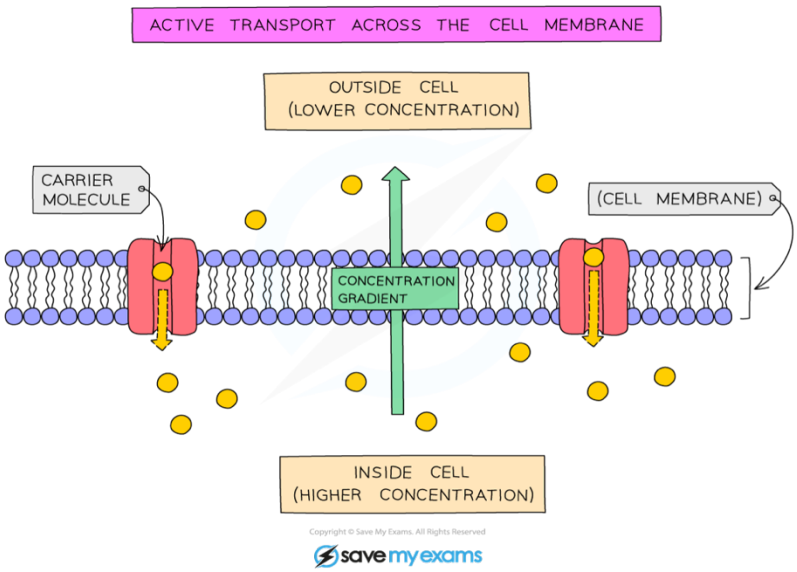



EXAMPLE


Examples of Osmosis
Plant Roots Absorbing Water and Minerals from Soil
Raisins Plumping Up in Water
Blood Cells Bursting in a Hypotonic Solution
Contact Lens Discomfort Due to Dehydration
Fruits and Vegetables Shrinking Due to Dehydration
Blood Cells Shrinking in a Hypertonic Solution

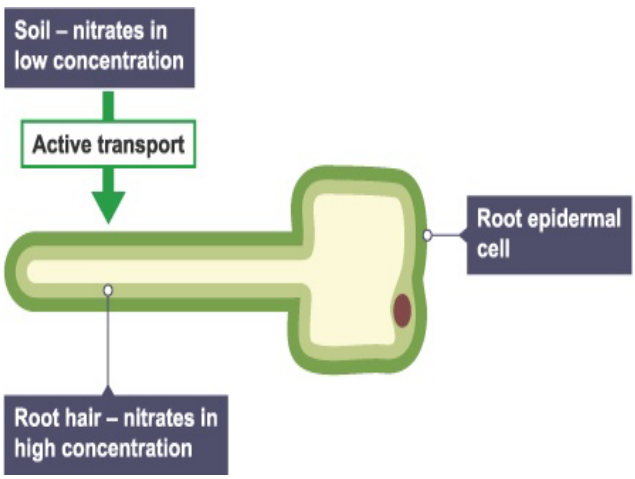
# 3- Active Transport

- **Definition:** Active Transport is defined as a process that involves the movement of molecules from a region of lower concentration to a region of higher concentration against a gradient or an obstacle with the use of external energy.

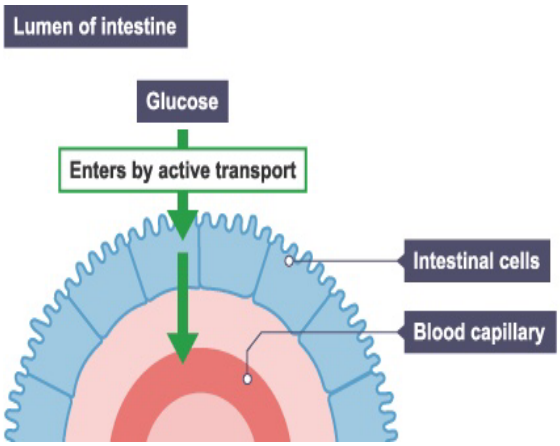



- **Examples**:

a) Root hairs take in minerals and water from the soil with the help of energy (ATP) by respiration for the plant growth.




b) In human active transport happen for example taking Glucose from the gut and kidney tubules.


Lumen of intestine
Glucose
Enters by active transport
Intestinal cells
Blood capillary