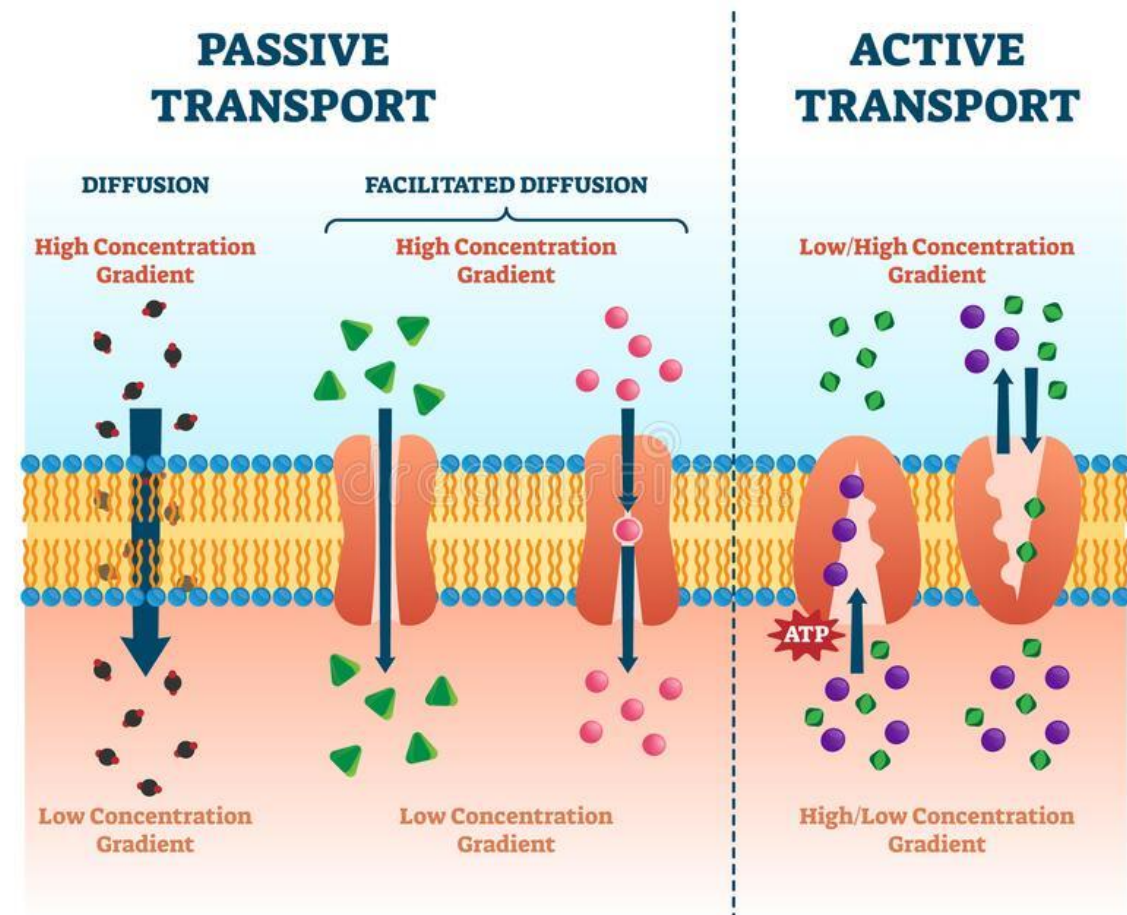
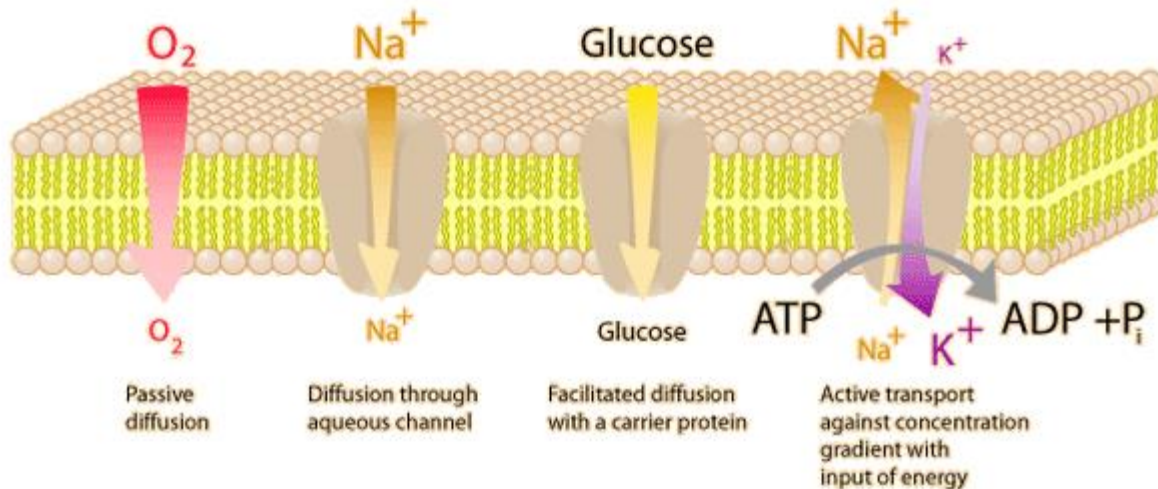


# Plasma Membrane

(Membrane Transport: Passive and Active)



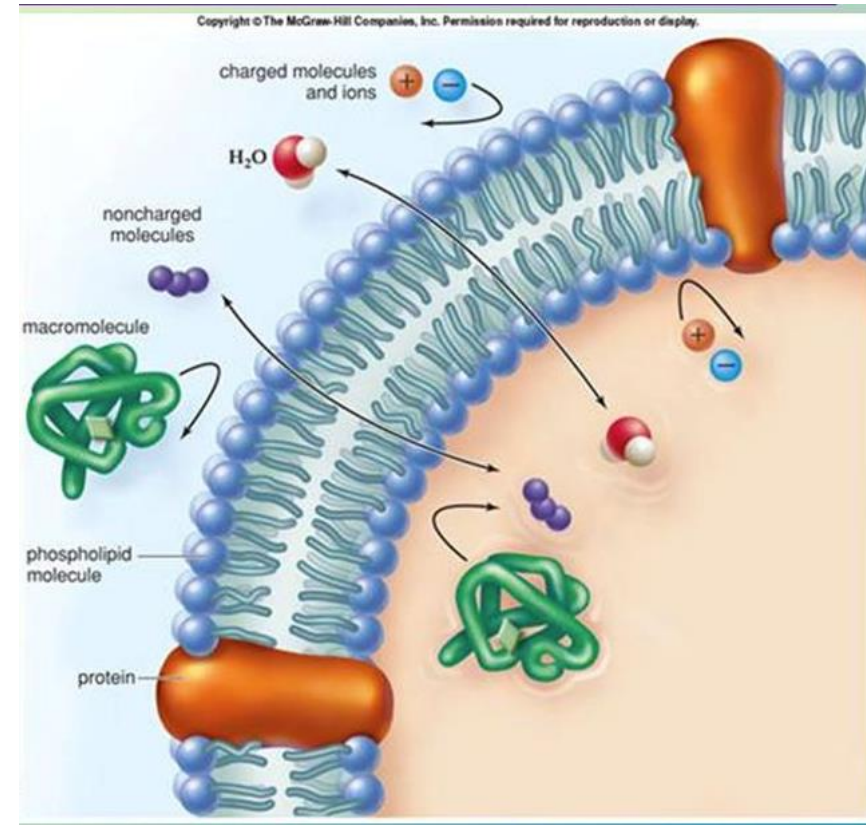
Dr. Rupesh B. Yadav

Asst. Prof.

TC College, Baramati.

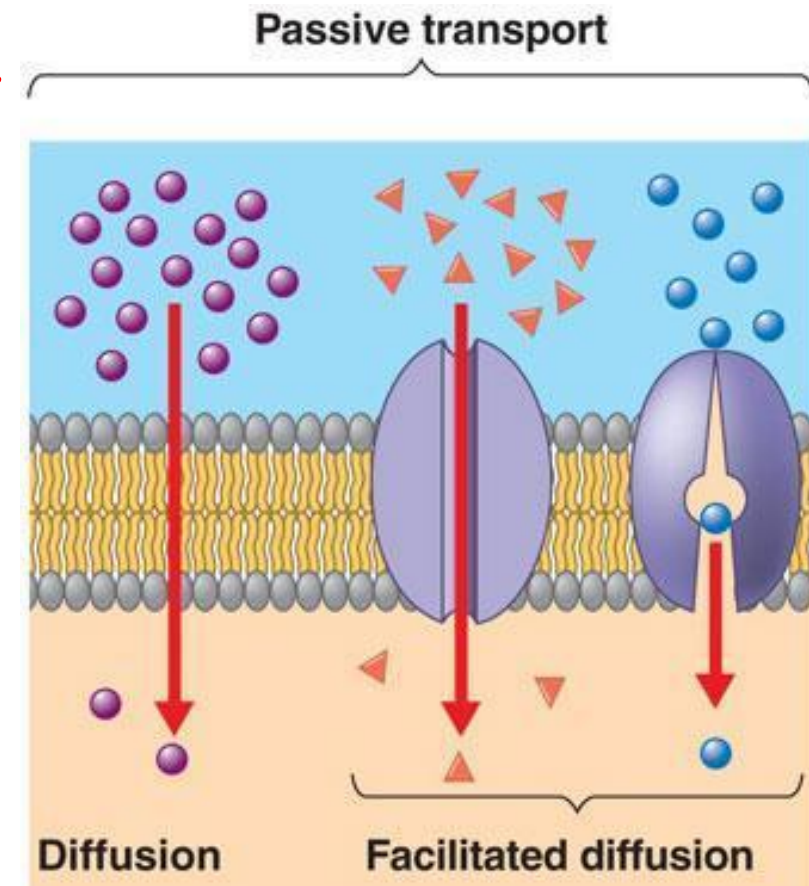
# Membrane Transport

- Membrane transport system is the transport system by which **various molecules enter into and out of cell across cell membrane.**
- Cells have **various transport mechanism.** Based on whether the molecules pass directly through lipid bilayer or via membrane channel, or not the molecules is altered as it passes through membrane or not the process require energy, membrane transport system is categorized into two major groups.



# Passive Transport

- Passive transport mechanism **does not require cellular energy to transport molecules** across cell membrane. So it is a passive process.
- In this transport system, molecules are transported from its **higher concentration to the lower concentration** until concentration gradient is moderated.
- Passive transport **does not work against concentration gradient.**

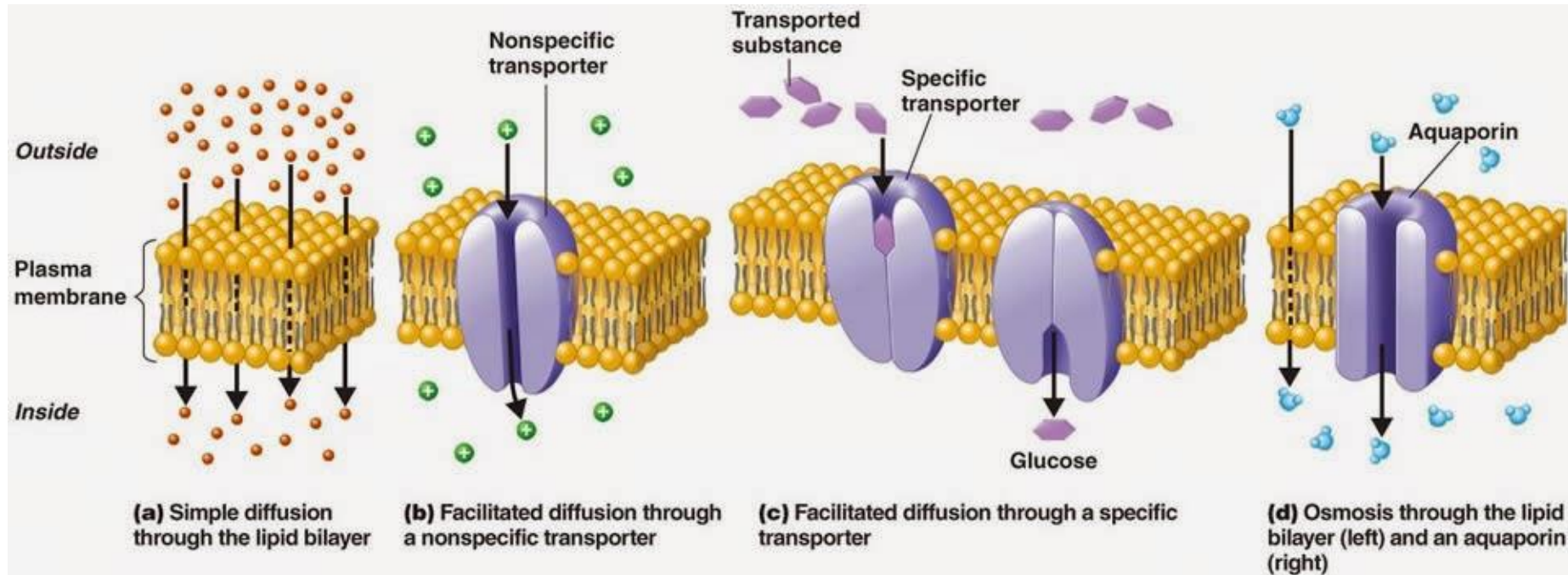


# Types of Passive Transport

1. Simple diffusion or passive diffusion

2. Osmosis

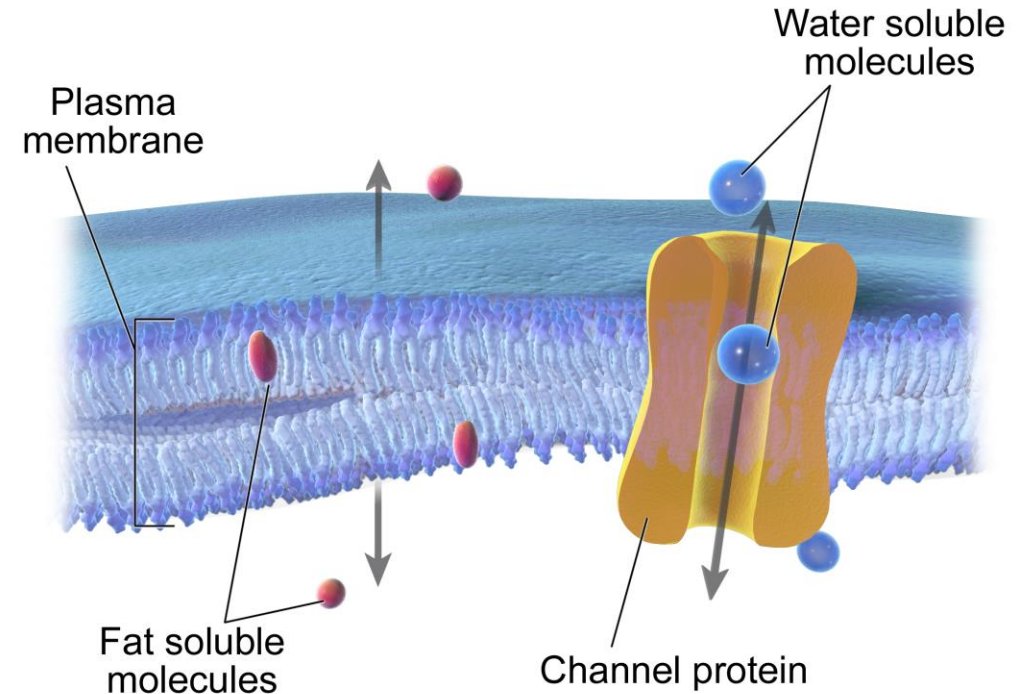
3. Facilitated diffusion



# Passive Transport

## 1. Diffusion

- **Simple diffusion is the transport or movement of molecules from higher concentration to lower concentration without expenditure of energy.**
- **In this process, molecules simply diffuses through the pore of cell membrane.**
- **Simple diffusion do not require transporter protein**

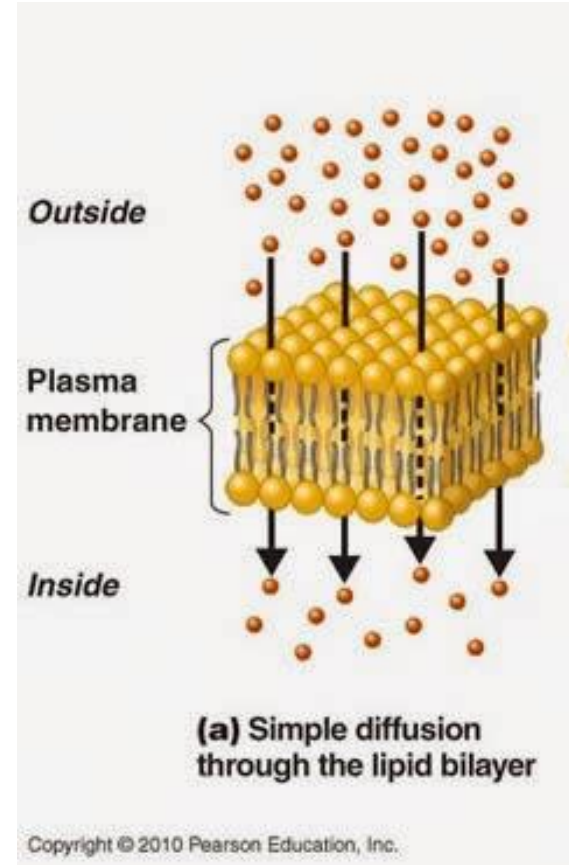


## Diffusion Across the Plasma Membrane

# Passive Transport

## 1. Diffusion

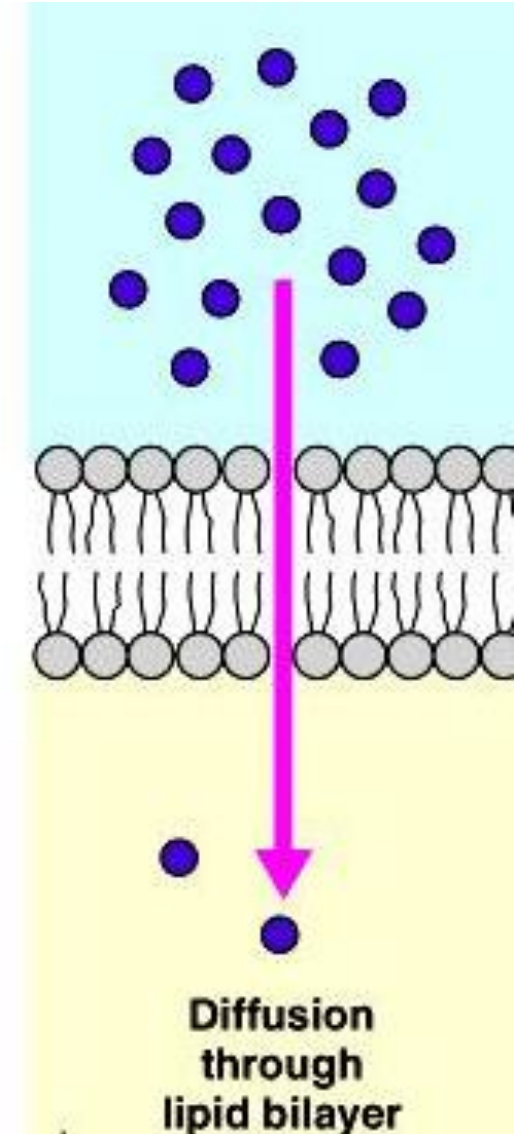
- When the concentration of **molecules is different inside and outside** of the cell membrane, **concentration gradient is established**. Then the molecules **moves from higher concentration to lower concentration until equilibrium is maintained**.
- When the **concentration of molecules becomes equal on both side of the membrane**, **transport process stops**.



# Passive Transport

## 1. Diffusion

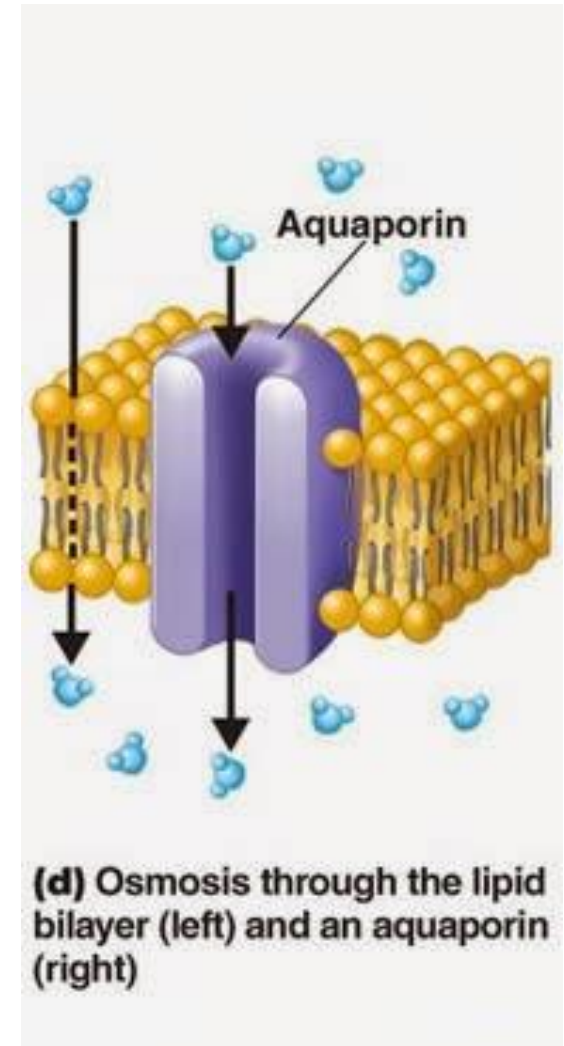
- The **rate of diffusion is determined by concentration gradient** and permeability of cytoplasmic membrane.
- **Greater the concentration gradient** and permeability of the cell membrane, will be allow greater rate of passive diffusion.
- **Examples: water or gases enter** the bacterial cell by simple diffusion.



# Passive Transport

## 2. Osmosis

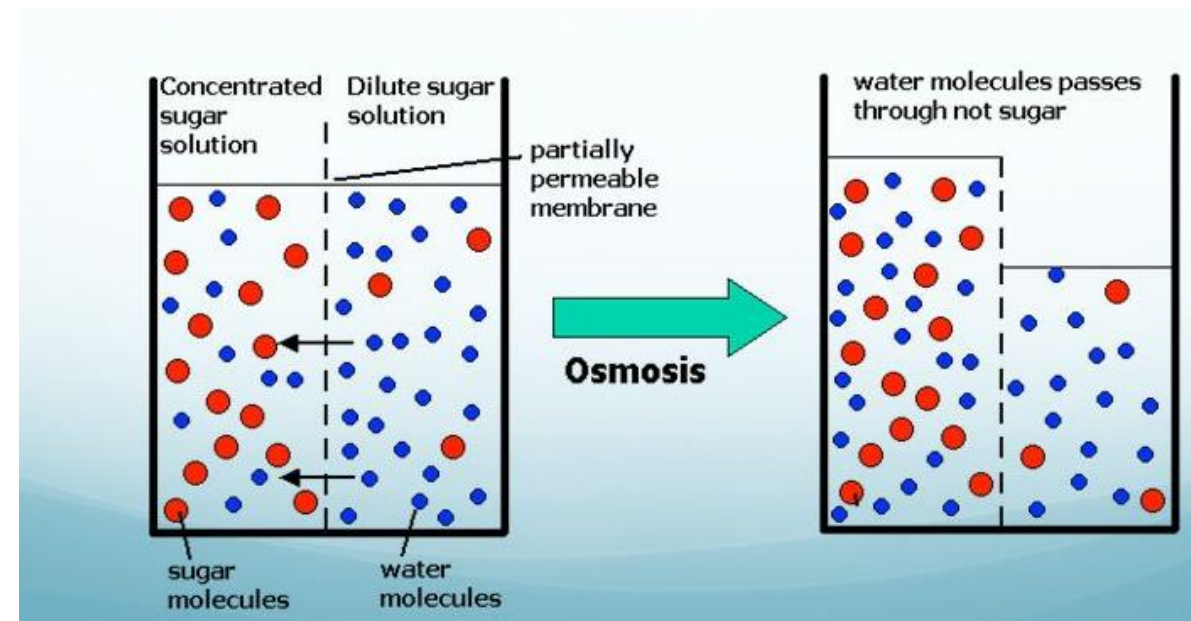
- **The movement of solvent (water) across membrane in response to the concentration gradient of solute is known as Osmosis.**
- **Bacterial cytoplasm have generally higher solute concentration than its surrounding.**
- **There are 3 types of solution based on comparison to the bacterial cytoplasmic concentration.**



# Passive Transport

## 2. Osmosis

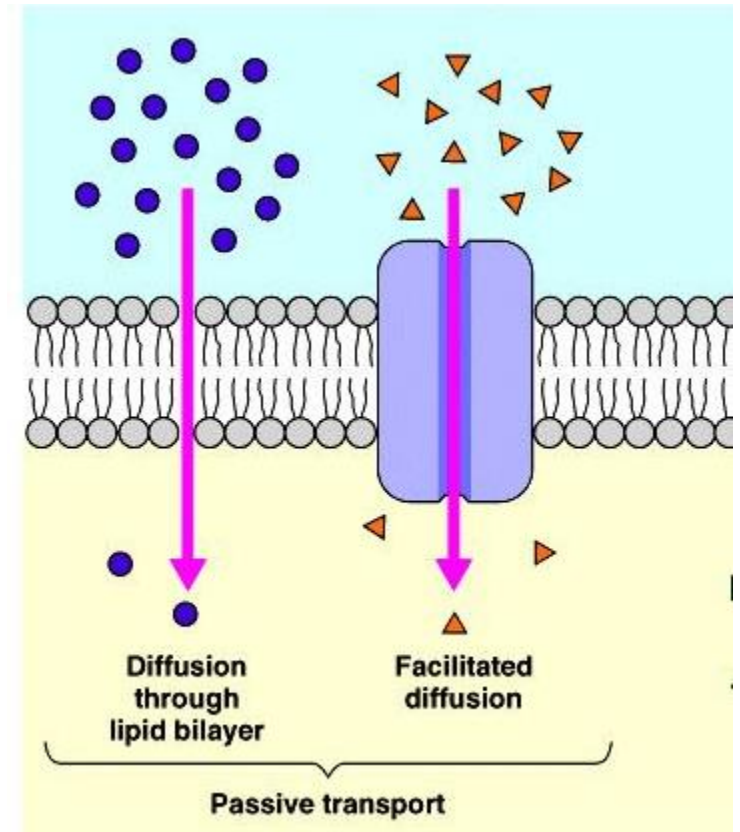
- In **isotonic solution**, water move equally in both direction inside and outside of cell.
- In **hypertonic solution**, water moves out of the cell so that cell shrinks. The process is known as plasmolysis.
- In **hypotonic solution**, water moves inside the cell so that cell swells up. The process is known as plasmolysis.



# Passive Transport

## 3. Facilitated diffusion

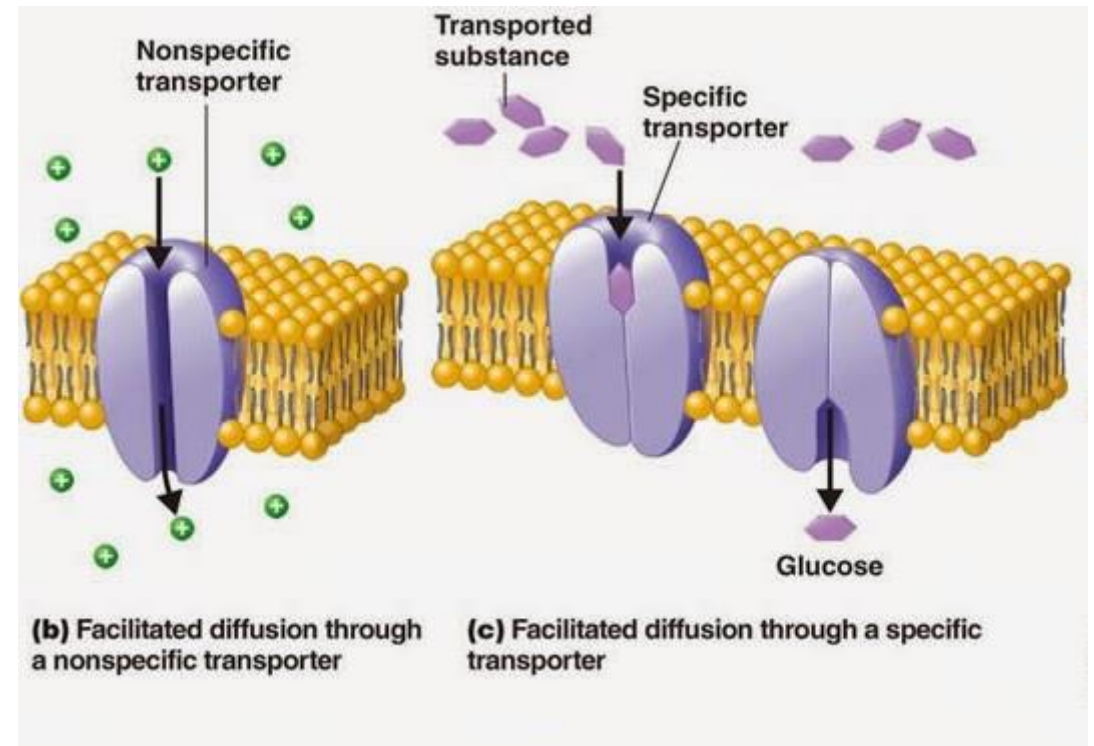
- The process of facilitated diffusion is similar to simple diffusion as the molecules move from higher concentration to lower concentration but it is different from simple diffusion because **it requires transporter protein for the process.**
- The transporter protein is known as **Permease or Carrier or channel protein.**



# Passive Transport

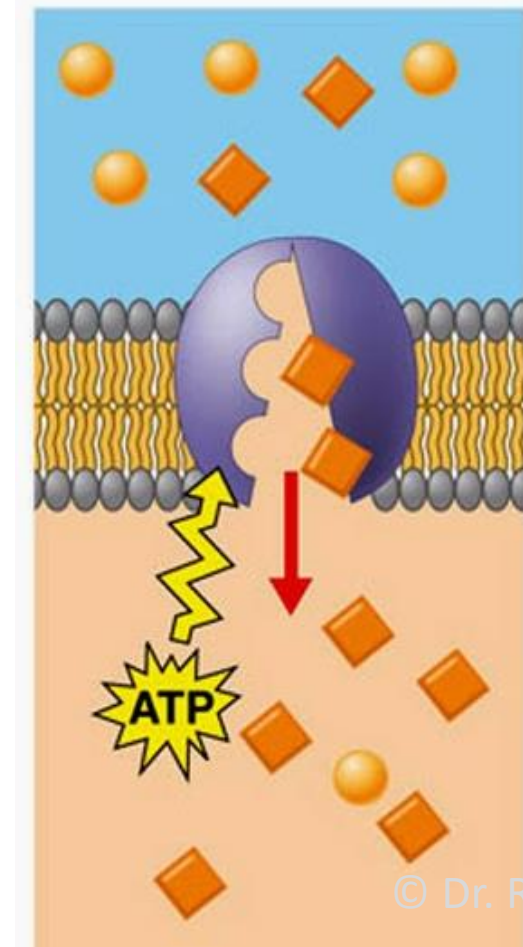
## 3. Facilitated diffusion

- The **transporter protein are specific** however some can transport multiple compounds.
- At first solute molecule binds with the transporter protein and changes the 3D structure of the transporter protein and this change in shape allows the solute to be carried across the membrane.



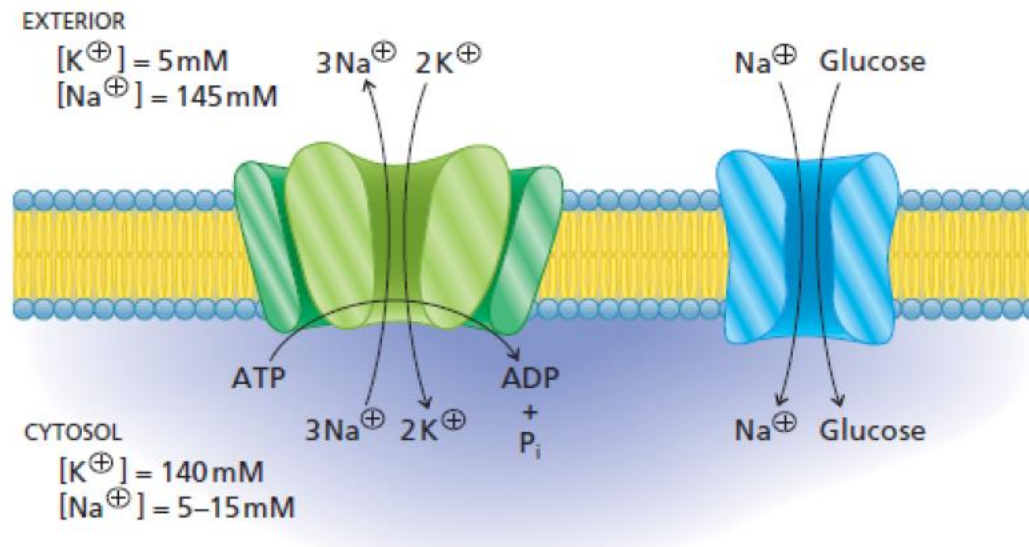
# Active Transport

- **Active transport requires transporter protein and continuous supply of cellular energy for the transport of molecules across concentration gradient of the membrane.**
- **Active transport is very important to transport the molecules which are present in very low concentration in the medium.**
- **In active transport permease or transporter protein carries the molecules across the membrane and the energy required to transport is obtained by ATP or Ion gradient.**



# Active Transport

- The substances transported by active transport are glucose, amino acids, organic acids and inorganic ions (**SO<sub>4</sub><sup>-</sup>**, **PO<sub>4</sub><sup>-</sup>**, **K<sup>+</sup>** etc.).
- Examples: **Lac operon** (transport of lactose in *E. coli*), Na-K pump

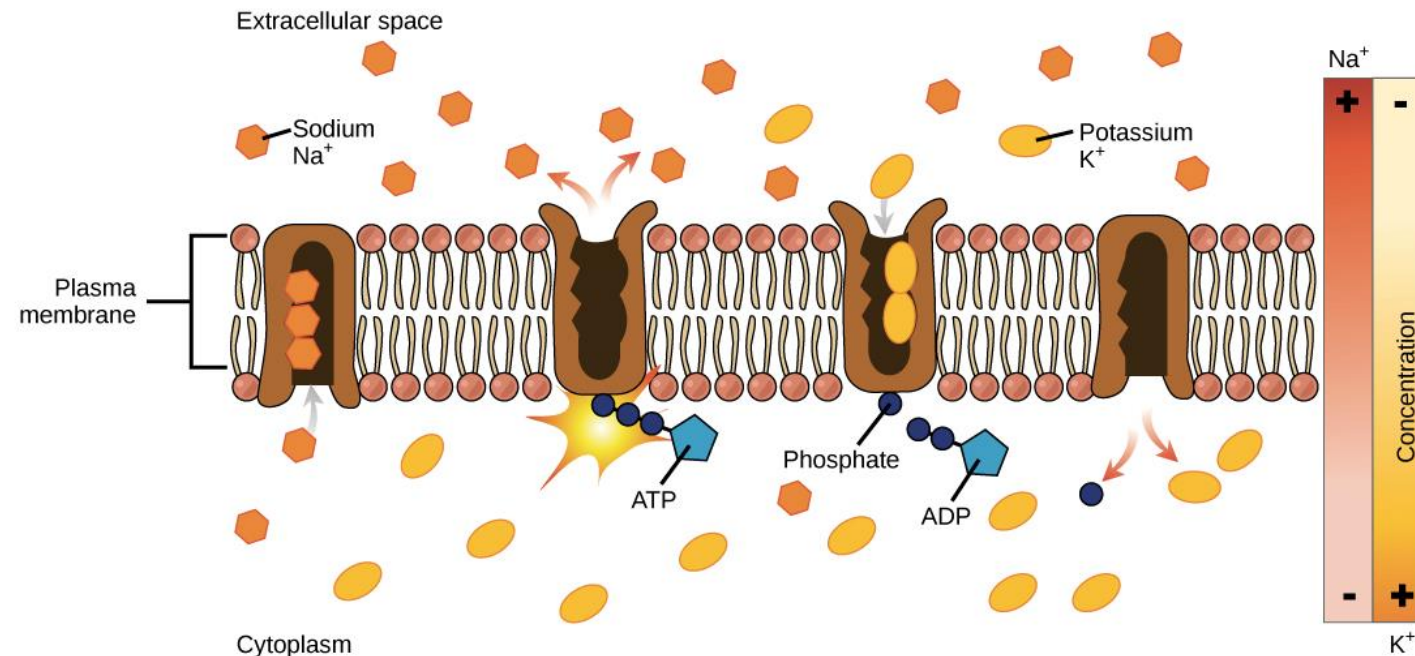


- Active transport system includes-

# Active Transport

## 1. Primary active transport

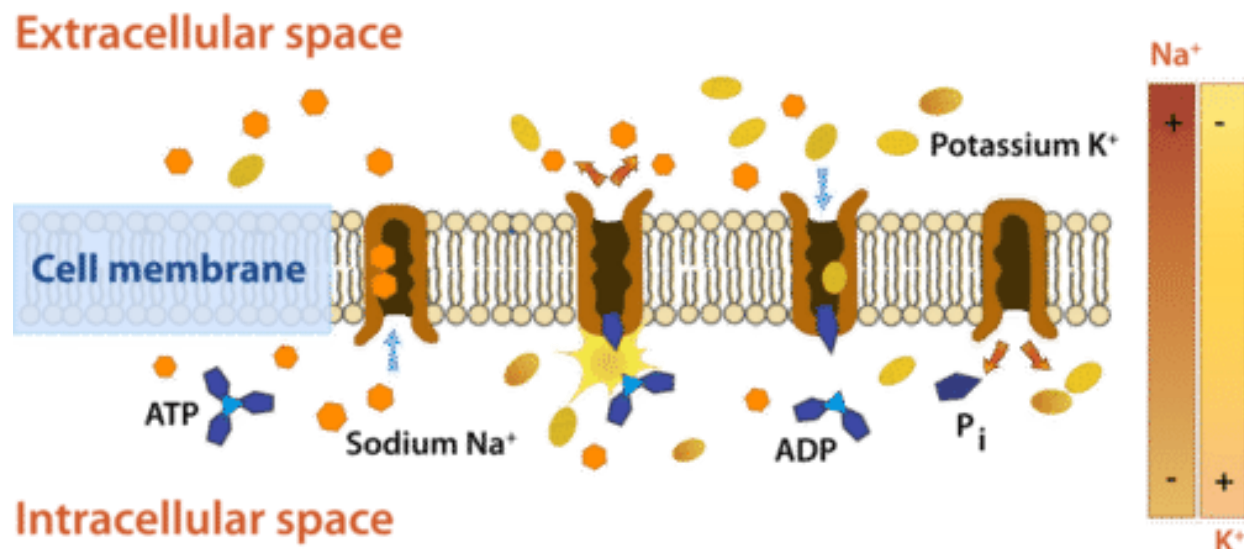
- In primary active transport, **hydrolysis of energy rich molecules such as ATP provide energy required for transport of molecules form lower concentration to higher concentration across membrane.**



# Active Transport

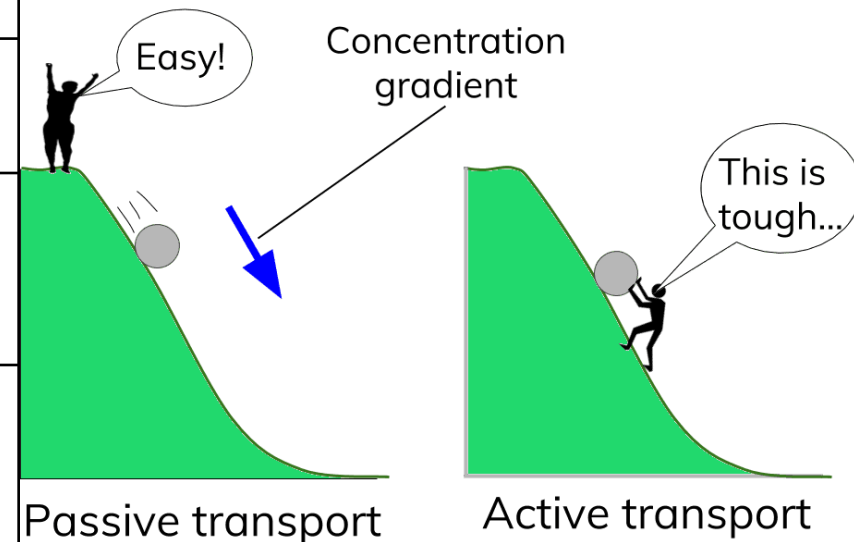
## 2. Secondary active transport

- In secondary active transport, one type of molecule migrates from higher concentration to lower concentration, releasing energy. This **released energy is used to transport** other molecule from its lower concentration to higher concentration across cell membrane.



# Difference between- Passive and Active Transport

Sr. No.	Passive transport	Active transport
1	Without the expenditure of ATP	ATP dependent
2	Moment of molecules is slow	Moment of molecules is fast
3	Moment of substance according to concentration gradient i.e. higher to lower	Moment can be against the concentration gradient
4	Semipermeable membrane may or may not be present	Semipermeable membrane may or may not be present
5	Not affected by low temperature, low O <sub>2</sub> or certain inhibitor like cyanide	Affected by low temperature, low O <sub>2</sub> or certain inhibitor like cyanide
6	Examples- 1. Osmosis 2. Diffusion 3. Facilitated Diffusion	Examples - Sodium Potassium pump, sodium pump, Potassium pump, calcium pump,



# Thank You

## Different types of membrane transport

