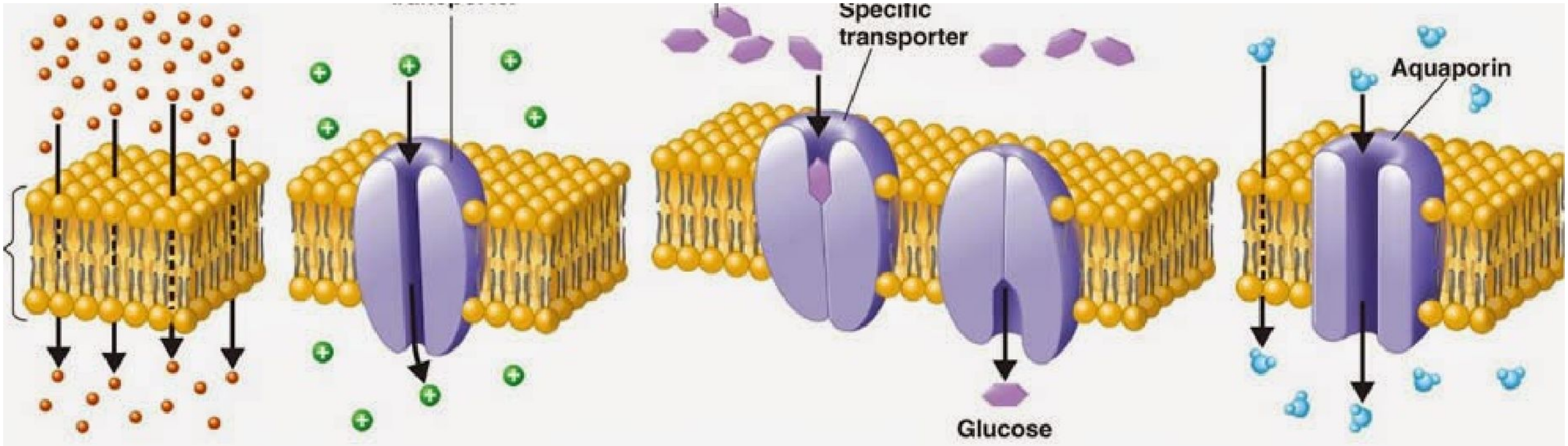

Specific
transporter
Aquaporin
Glucose

The mechanism of passive transport

Learning objective

- to explain the mechanism of passive transport

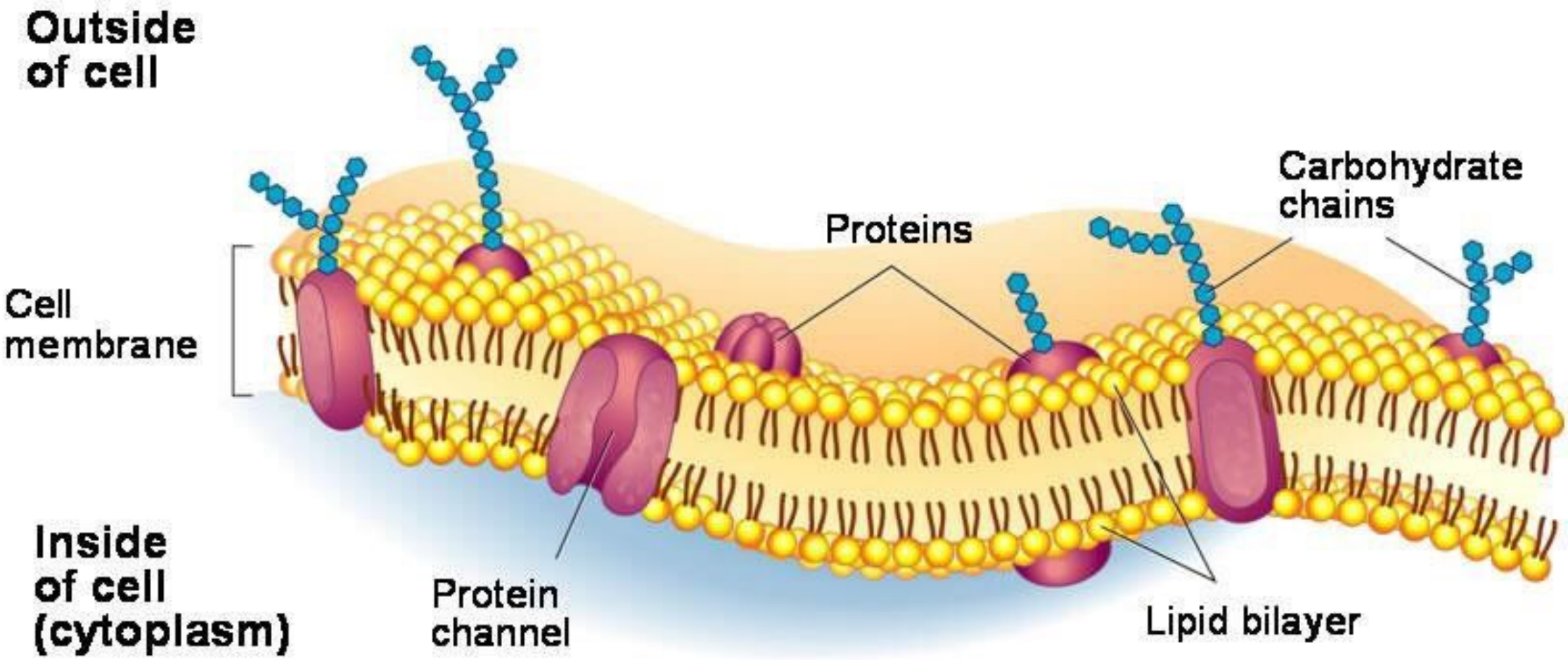
Success criteria

- Describe types of passive transport in an oral or written form.
- Explain passive transport mechanism.
- In order to achieve learning objectives fulfill correctly at least 80% of work.

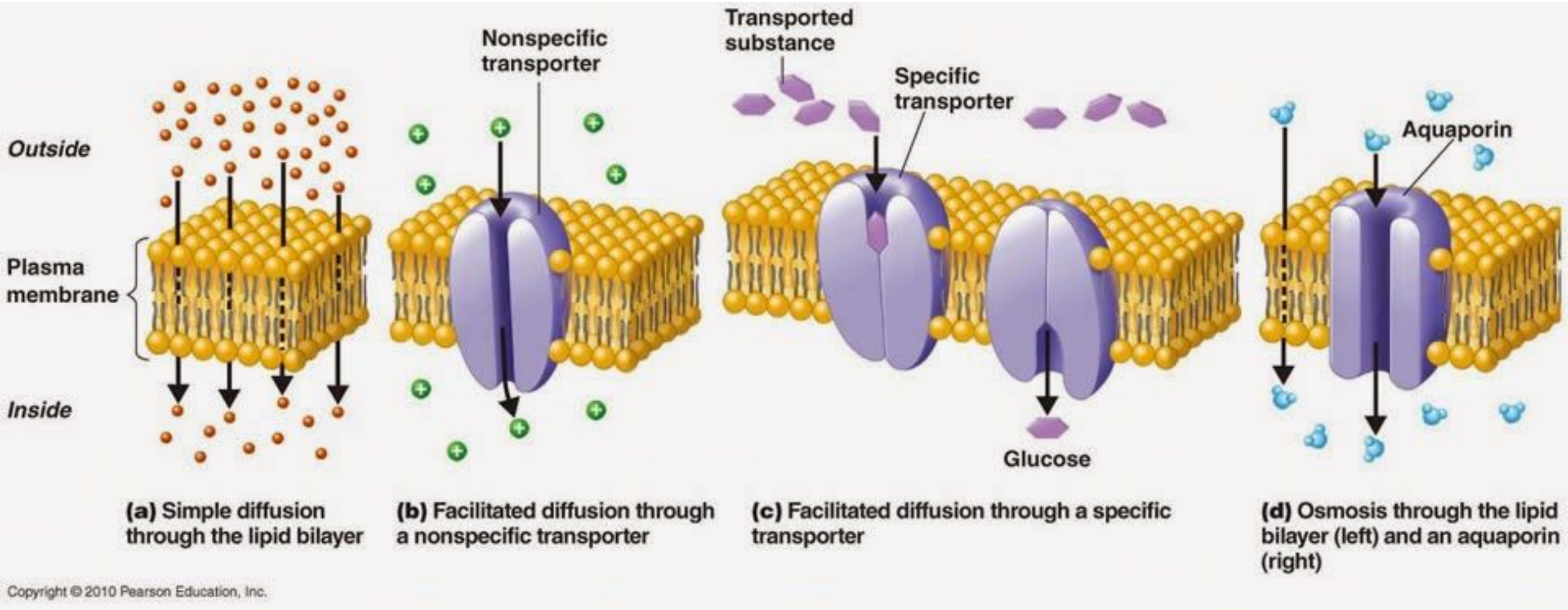
Terminology

- Passive transport
- Diffusion
- Facilitate diffusion
- Osmosis
- Concentration gradient
- Channel proteins
- Gate
- Carrier proteins
- Plasma membrane/permeable membrane
- Randomly
- Passive movement
- Lower/high solute concentration
- Isotonic/hypertonic/hypotonic

Cell membrane is selectively permeable – not all molecules can **pass through**



Types of passive transport



Passive transport

The **movement of substances down a concentration gradient** from an **area of high concentration** to an **area of lower concentration** without the need for **energy to be used**.

3 types are passive transport:

- **Simple diffusion**
- **Facilitate diffusion**
- **Osmosis**

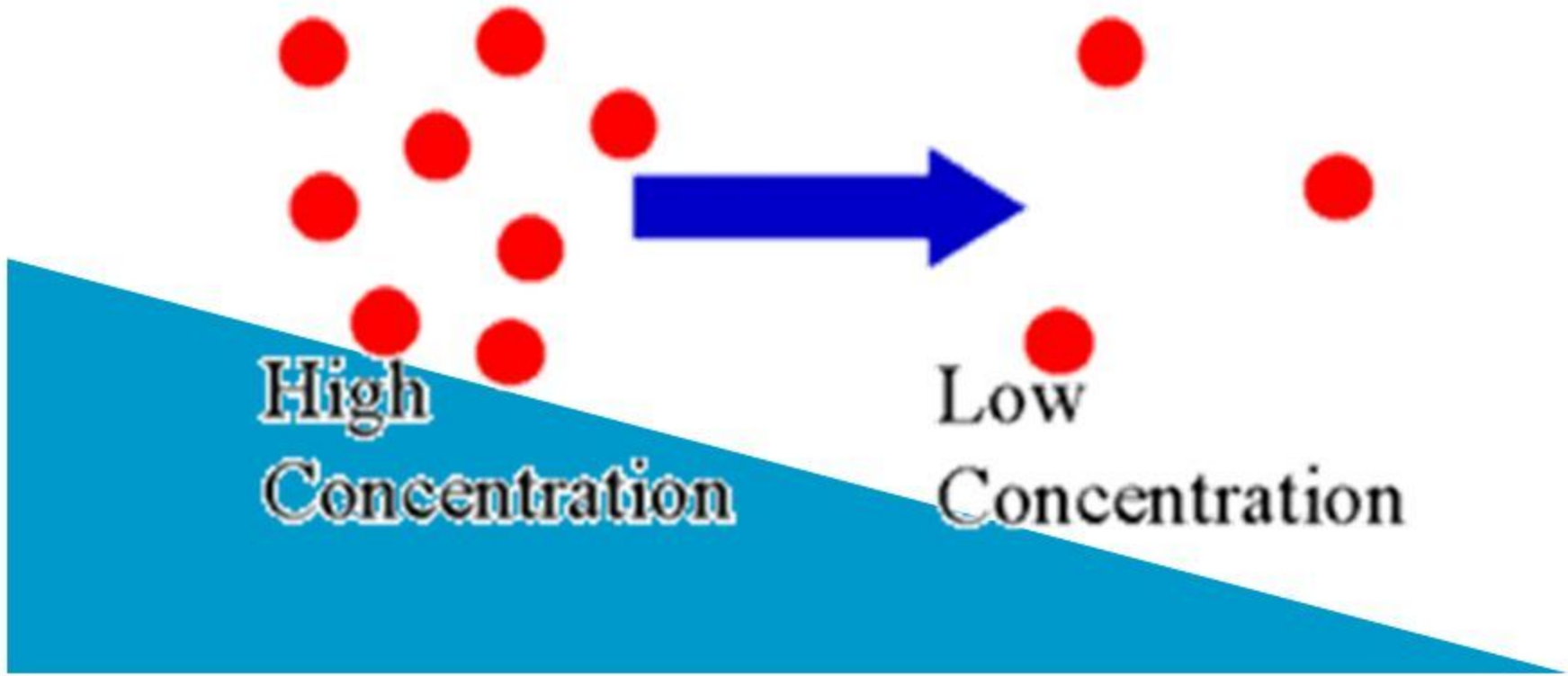
1. **Diffusion**: molecules move straight through the membrane.
2. **Facilitated diffusion**: molecules or ions move through channel proteins embedded in the membrane.
3. **Osmosis**: water molecules move through the membrane (mostly through protein channels).

Sample diffusion

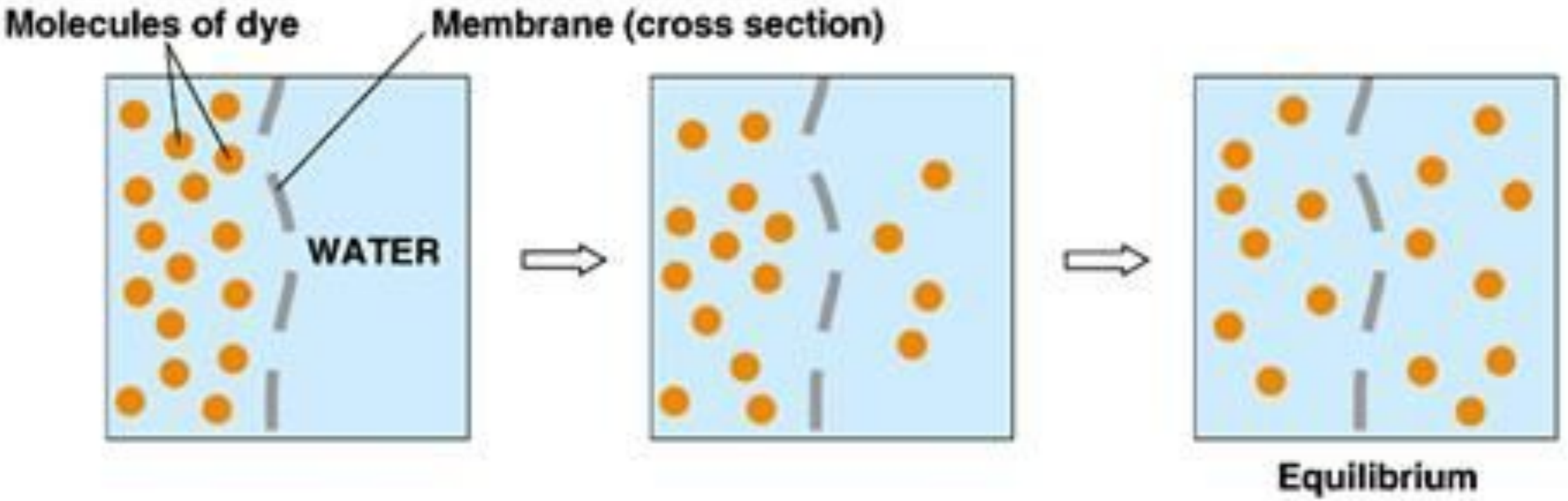
- This is passive process, which takes place as molecules move randomly.
- No energy input is required, and movement occurs by way of a simple concentration gradient.

Diffusion

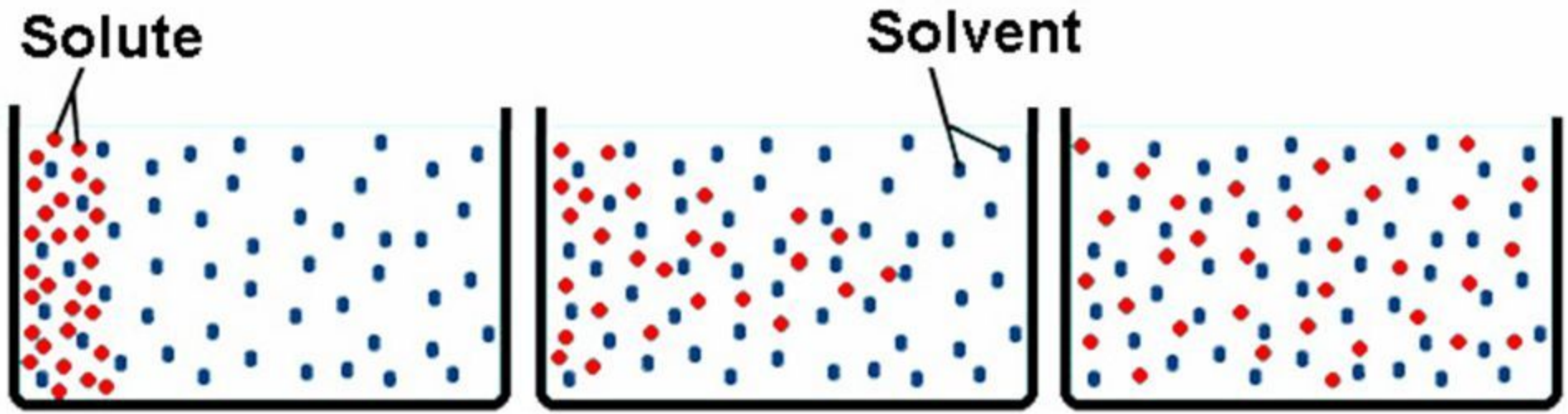
- Movement of molecules from areas of high concentration to areas of lower concentration.



Equilibrium



Diffusion will continue until ***equilibrium*** is reached. This means there will be an equal distribution of molecules throughout the space. This is why food coloring moves throughout a beaker of water; why odors smell strong at first and then disappear over time.

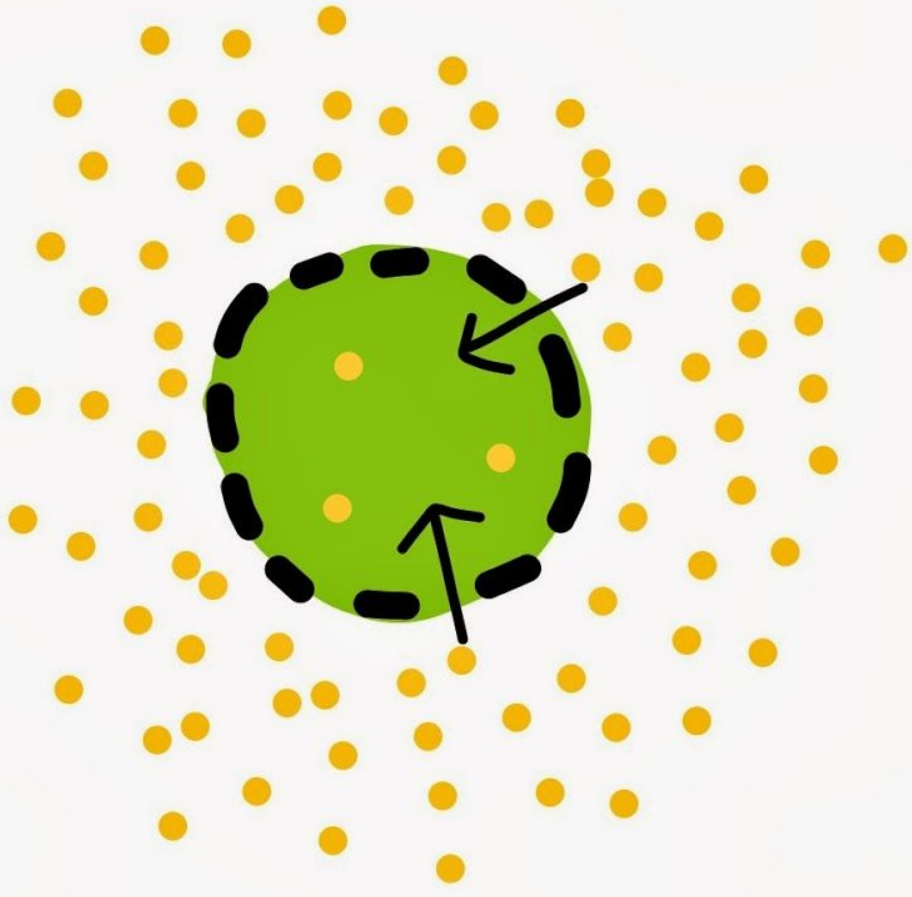


Equilibrium, a result of diffusion, shows the uniform distribution of molecules of different substances over time as indicated in the above diagram.

Sample diffusion

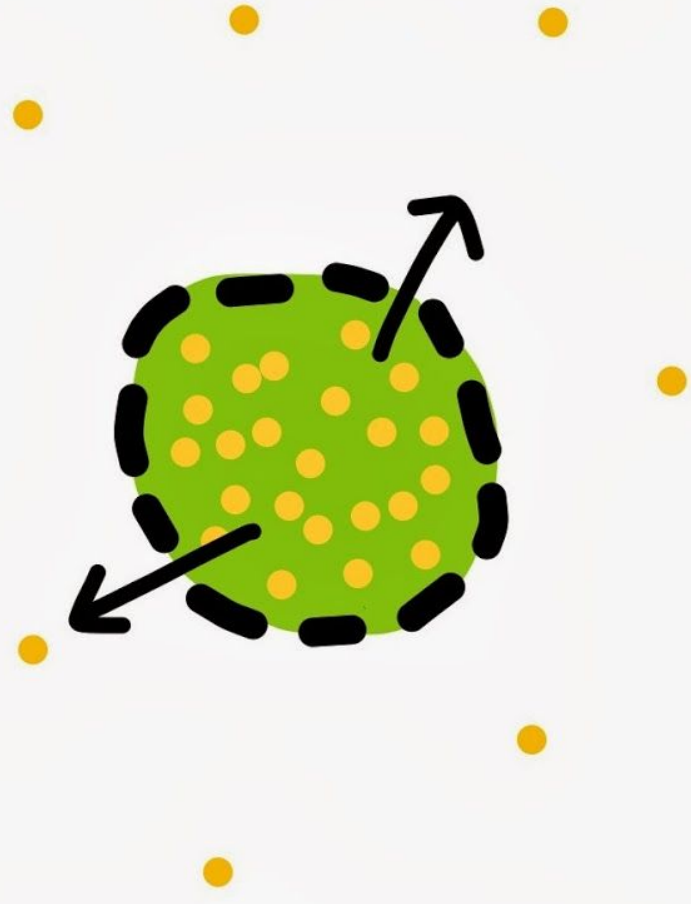
- **Many molecules pass into and out of cells by diffusion, for example:**
- **Oxygen**
- **CO_2**
- **Water**

Diffusion

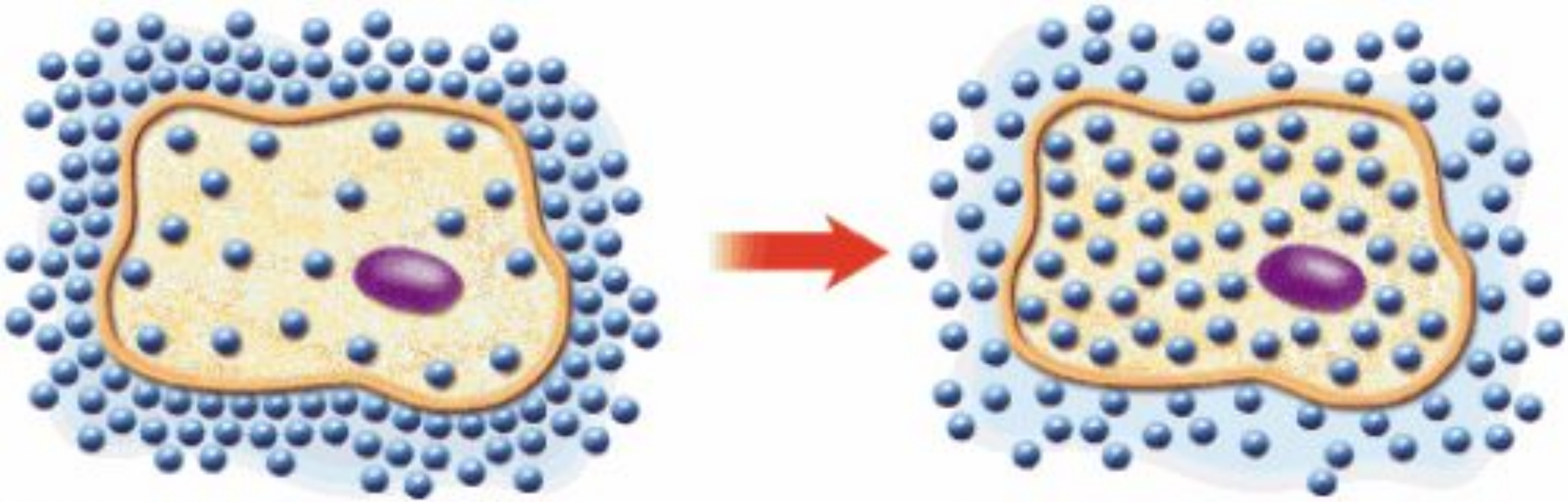


Higher Concentration of IONS in Extra Cellular Fluid

Diffusion



Higher Concentration of IONS within the Cell



Before Diffusion
There is a higher concentration of oxygen molecules outside the cell than inside the cell.

After Diffusion
The concentration of oxygen molecules is the same outside and inside the cell.

Facilitated diffusion

Many polar molecules movement through **channel proteins.**

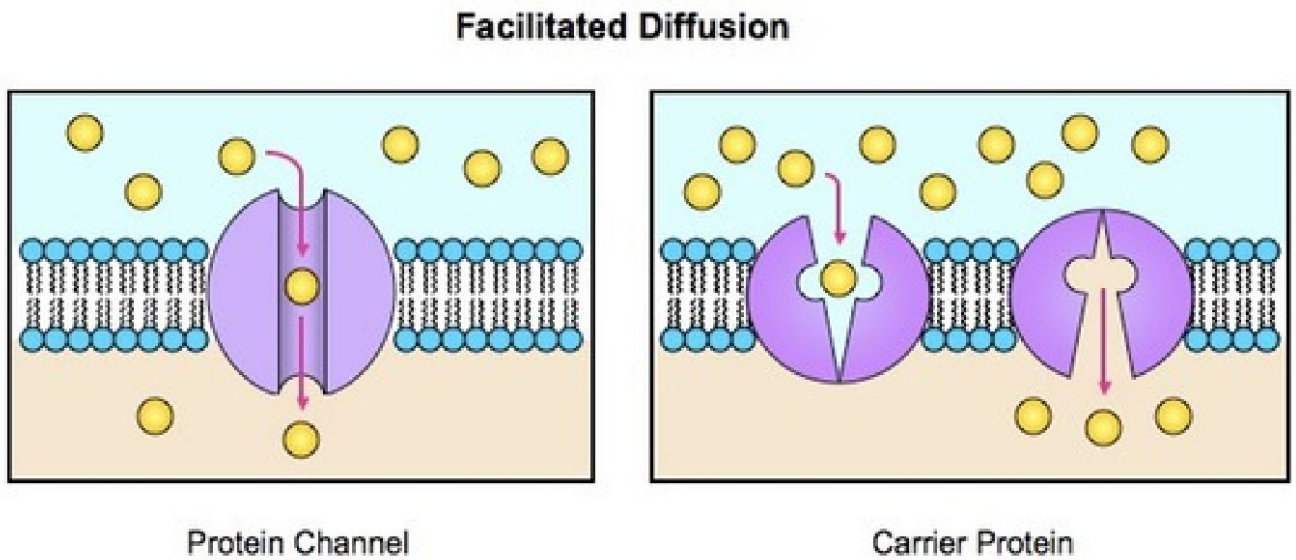
Polar molecules cannot diffuse through the lipid bilayer of the membrane.

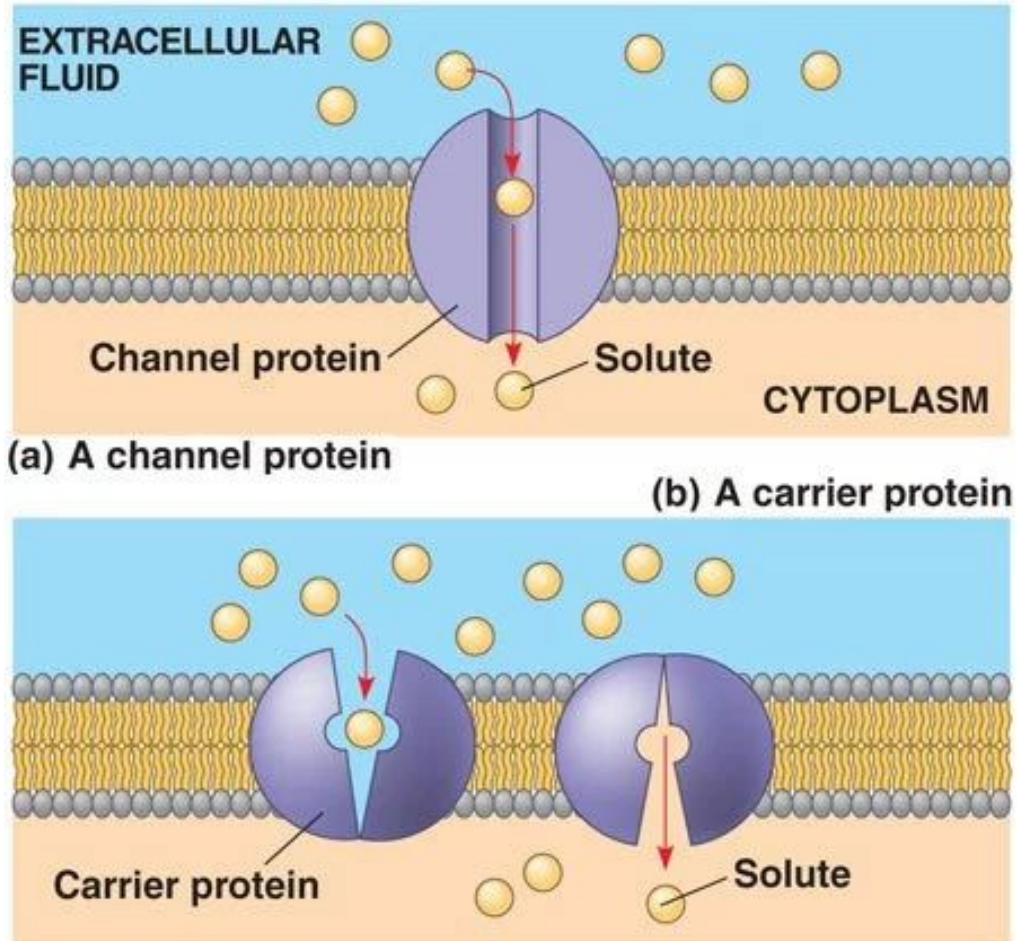
Carrier protein first combines with the diffusing molecules on one side of the membrane, carries them through the **channel protein and releases them on the other side.**
Faster then sample diffusion.

No ATP energy input.

Facilitated Diffusion

Diffusion involving the presence of protein carrier molecules to allow the passive movement of substances across a plasma membrane.





Facilitated diffusion

- The movement of substances down a **concentration gradient from** an **area of high concentration** to an **area of lower concentration** without the need for energy to be used.

Facilitated Diffusion

Facilitated diffusion uses the same principle as **ordinary diffusion**, except that **protein carriers** are involved.

Small molecules like **O_2** and **CO_2** can simply diffuse across a membrane without any help.

Larger molecules like **amino acids** and **glucose** can't diffuse directly through the phospholipid bilayer.

They still move down a **concentration gradient**, but because they're so big, they move through **carrier proteins** or **channel proteins.**

Facilitated diffusion is also **passive** (no energy).

Simple Diffusion

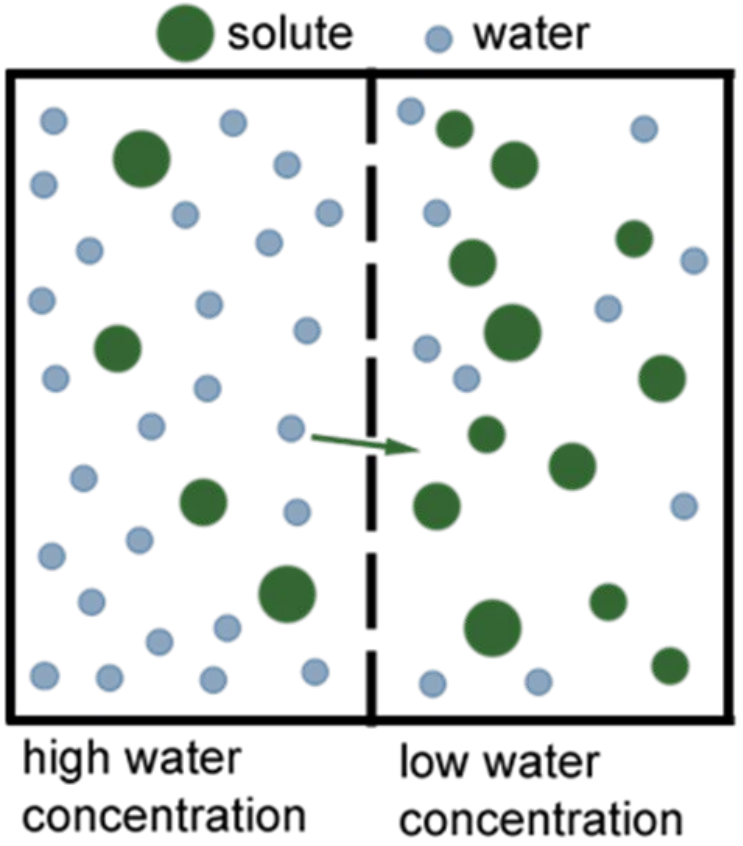
- Through the phospholipid bilayer
- Happens to the small and non-polar particles

Facilitated Diffusion

- Through the transport protein
- Happens to large or polar particles

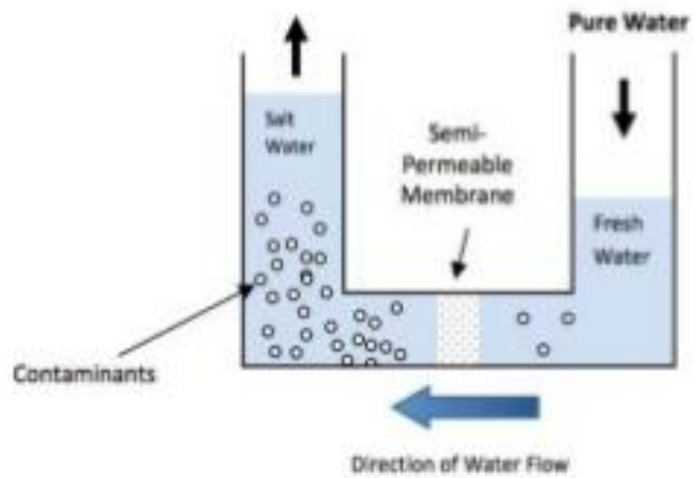
Osmosis

- **A special case of diffusion is osmosis.**
- This is **passive movement of water** across partially permeable membrane from an area of lower concentration to an area of high solute concentration.
- **Aquaporin** - also called water channels, are integral membrane proteins.



Osmosis

- To understand purpose and process of RO, you must first understand naturally occurring process of Osmosis
- It is a process where a weaker saline solution will tend to migrate to a stronger saline solution
- For example, Plant root absorbs water from soil & Kidney absorbs water from blood
- In diagram, salts are more concentrated in salty water so natural flow of salts will be from right side to left side and water will flow from right side to left side



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