Transport across plasma membranes

→ Movement of the substances across plasma membrane.

① passive transport

without energy input (ATP)

Downhill

↑ concentration to ↓ concentration

Ⓐ Simple diffusion

→ throug PL bilayer

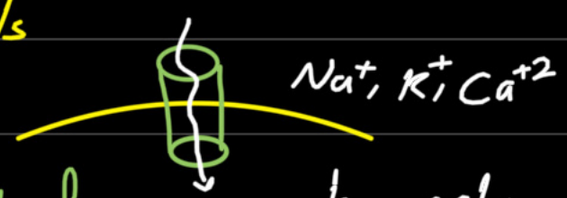
- lipid soluble

CO_2, O_2, No, Steroid hormone .....

- the rate depends on the lipid solubility

→ throug channels

- water soluble



Na^+, K^+, Ca^{+2}

- the rate depends of channels are opened

channels
- Gated
- Non-Gated (leaky)

⇒ Fick's Law

$J = P \cdot \Delta C$

$P = D \cdot A / \Delta X$

$J = D \cdot A \cdot \Delta C / \Delta X$

J = rate of diffusion , P = permeability

D = diffusion coefficient

A = surface area , C = concentration

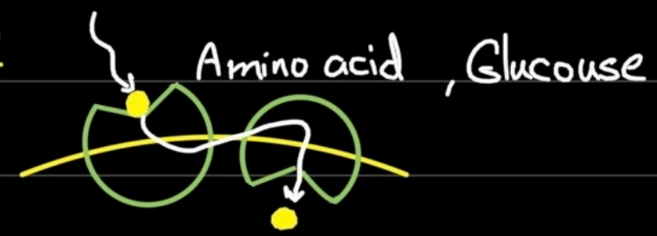
X = membrane thickness

Ⓑ facilitated diffusion

→ throug carriers transport

- water soluble
- Max rate

← Saturation



Note: in simple diffusion the relation between the diffusion rate and concentration is linear, while in facilitated diffusion its proportional but non-linear due to a limitation called (Vmax)

© Osmosis

diffusion of solvent molecules from region ↑ water (↓ particles concentration) to a region of ↓ water (↑ particles concentration)

- the water molecules reach equilibrium when the increasing hydro_static pressure has opposed the first compartment to the second compartment

→ osmotic pressure: when the pressure is applied to a solution and the water levels becomes equal in both sides

→ applying more pressure than the osmotic pressure will result in a process we call Filtration

→ movement of water and solutes from region ↑ hydrostatic pressure to " ↓ " "

- osmotic pressure depends on osmolarity

→ refers to the number of solute particle per unit liter

- osmolarity = g × c

g → no. of particles in a solution

c → concentration Mol/L

⇒ Van't Hoff's Law → the equation used to calculate the osmotic pressure

$\Pi = RTC$

Π → osmotic pressure , R → gas contant , T → Tempreture, C _ Concentration

_ Another thing related to the osmolarity is the <u>osmolality</u>

_ Osmolality : is the number of solute particles per unit mass

Tonicity of solution

_ Isotonic solution
↳ no change

_ Hypotonic solution
↳ cell swell and burst

_ Hypertonic solution
↳ cell shrink and shrivel

_ the body cells osmolarity lies between 280 and 300 mOsm/