S1IP SCGS

Science - Transport in Living things

☆ Passive transport → No energy required

Active transport → Energy required

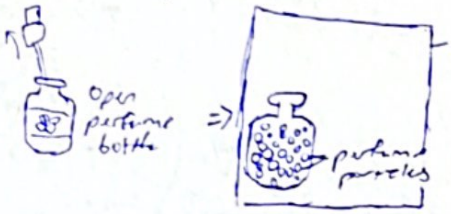
Diffusion

Definition: Diffusion is the net movement of particles from a region of higher concentration to lower concentration (↓ down a concentration gradient)

☆ Concentration → no. of particles in a certain volume.

How does Diffusion occur?

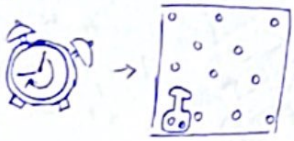
eg. perfume particles



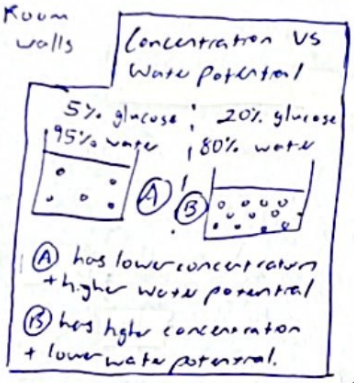
☆ Particles move in random directions (KPT)

BUT

Net movement to place with less of that particles



Concentration vs Water Potential



(A) has lower concentration + higher water potential

(B) has higher concentration + lower water potential.

* Other eg.
- → blood cells & surrounding tissues
- → root hair cells & mineral salts
- → leaf cells & O_2 / CO_2
- → Absorbed digested food from small intestine into bloodstream.

Important - Diffusion

- → No membranes required (but can still happen even if there is one anyway)
- → Anything EXCEPT water

☆ NO ENERGY REQUIRED

Rate of diffusion - factors

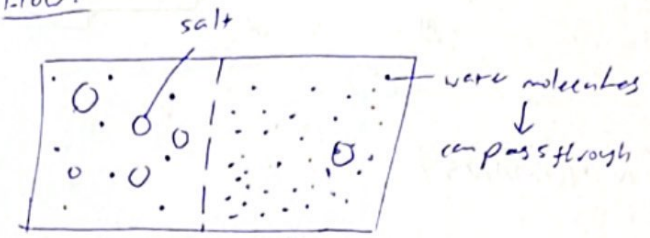
- → State of matter (gases fastest, solid slowest)
- → Temperature (higher temp = faster moving particles)
- → Concentration gradient (larger = faster)
- → Surface area in contact (more = faster)

Osmosis

Definition = net movement of water molecules from a region of high water potential to a lower water potential across a partially permeable membrane.

☆ Water potential → basically concentration but for water

How?



☆ water particles are the only particles small enough to pass through the membrane (other no-big particles)

FYI

Hypotonic → Relatively lower water potential

Hypertonic → Relatively higher potential

Isotonic → Same water potential.

Important → Osmosis → ☆ NO ENERGY REQUIRED

- → MUST have Partially Permeable Membrane.
- → the WATER moves (and not anything else)

Examples

- → Root hair cell - water
- → Absorb water into adhesive tract.

SUMMARY

Diffusion	Osmosis
→ Passive transport (no energy)	→ Passive transport (no energy)
→ NOT water	→ ONLY water
→ With OR without partially permeable membrane	→ Must have partially permeable membrane
→ High concentration to low concentration	→ higher water potential to lower water potential

Active Transport

↳ Active transport : the movement of substances AGAINST a concentration gradient.

⚠ Important
- → Needs energy (usually from mitochondria)
- → Basically opposite of diffusion

Eg. Plant cell needs glucose.
Plant cell has more glucose than surroundings still have some (but less)
⇒ Plant cell use active transport to get the glucose in.

Tip: Osmosis = 0 energy needed
Diffusion ⇒ Don't need energy
Active transport ⇒ Absolutely need energy

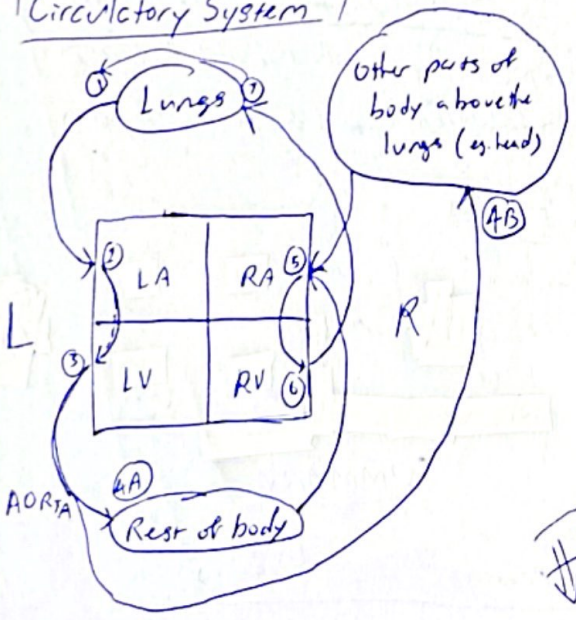
IN HUMANS

↳ Human too big ⇒ diffusion & osmosis ⇩ INEFFICIENT.

Solution: TRANSPORT SYSTEM!!

Specialised Cells ⇒ Tissues ⇒ Organ ⇩ organ system

Circulatory System



Blood