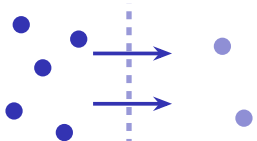
Movement Into & Out of Cells

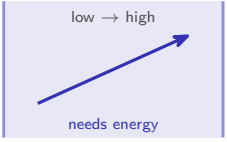
IGCSE Biology ▪ Topic 3

IGCSE Biology



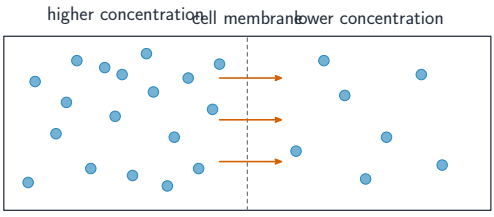
What we will cover

1. Diffusion
2. Osmosis
3. Osmosis & plant cells
4. Active transport
5. Comparing the three

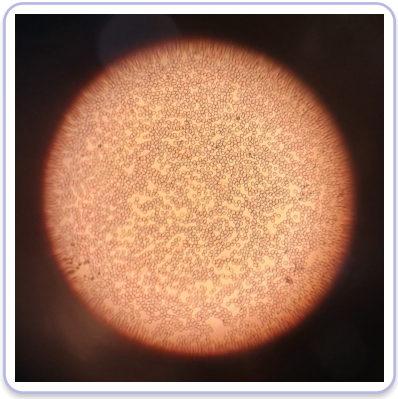


active transport

Diffusion

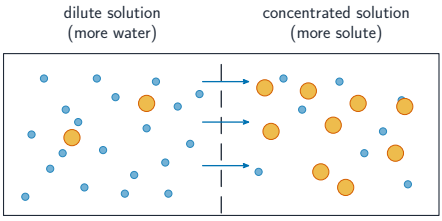


net movement of particles down the concentration gradient



Specialised cells match their jobs

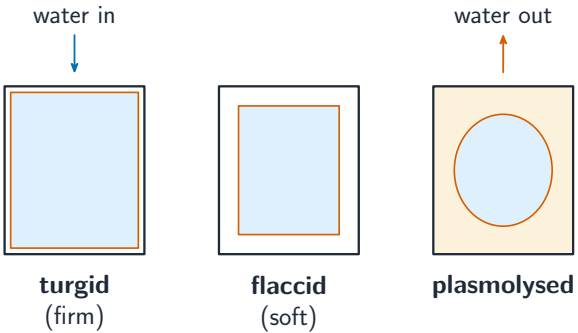
Osmosis



water moves by osmosis to the concentrated side; solute is too big to cross

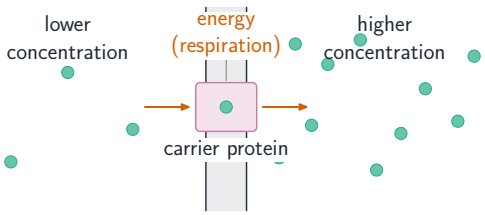
Water leaves cells in strong solutions

Osmosis and plant cells



- water in → **turgid** 膨胀 (firm; supports the plant)
- water out → **flaccid** 松软 (soft)
- more out → **plasmolysis** 质壁分离

Active transport



particles moved against the gradient, using energy

Active transport 主动运输 moves particles against the gradient (low → high).

> It needs energy from **respiration** 呼吸作用 & a **carrier protein** 载体蛋白 – e.g. root hairs take up minerals.

Comparing the three

diffusion – high → low; no energy; particles, gases, solutes

osmosis – high → low water potential; no energy; water only

active transport – low → high (against); needs energy; ions & molecules

Worked example – percentage change in mass

A potato cylinder is $5.0\,\mathrm{g}$ before soaking and $5.6\,\mathrm{g}$ after. Find the percentage change.

- Change in mass $= 5.6 - 5.0 = 0.6\,\mathrm{g}$ (a gain).
- % change $= \dfrac{\text{change}}{\text{starting mass}} \times 100$
- $= \dfrac{0.6}{5.0} \times 100 = +12\%$
- It gained water, so the solution was more dilute than the cell sap.

Always divide by the starting mass, and keep the $+$ or $-$ sign. Gain $\Rightarrow$ water moved in by osmosis $\Rightarrow$ the outside was more dilute.

Topic 3 – key takeaways

1 Diffusion

down the gradient; no energy

2 Osmosis

water only, partially permeable membrane

3 Plant cells

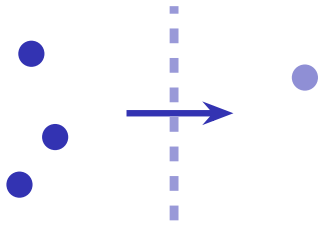
turgid, flaccid or plasmolysed

4 Active transport

against the gradient; needs energy

Check yourself

1. Which way do particles diffuse along a gradient?
2. What substance moves in osmosis?
3. What does a plant cell become in pure water?
4. Which process needs energy from respiration?



Answers **1.** high to low concentration **2.** water **3.** turgid (firm) **4.** active transport