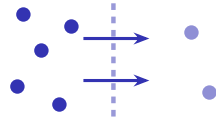


Movement Into & Out of Cells

IGCSE Biology ■ Topic 3

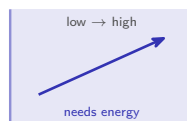
IGCSE Biology



Movement Into & Out of Cells

What we will cover

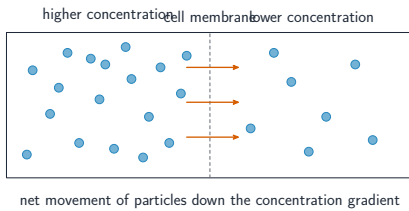
- 1 Diffusion
- 2 Osmosis
- 3 Osmosis & plant cells
- 4 Active transport
- 5 Comparing the three



active transport

1 Passive movement

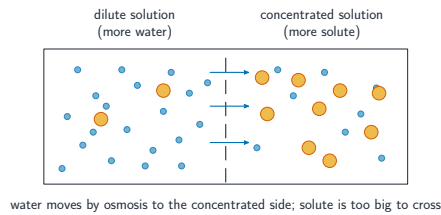
Diffusion



The particles spread out because of their own **random movement** 随机运动.

The **energy** 能量 for diffusion comes from the **kinetic energy** 动能 of the random movement of **molecules** 分子 and **ions** 离子 – so diffusion needs **no** extra energy.

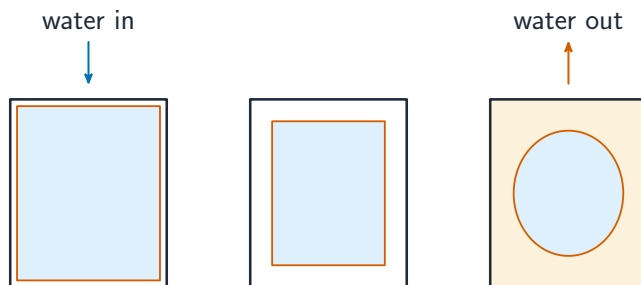
Osmosis



- In **pure water or a dilute solution**, water moves **into** the cells. The cells swell and become firm, or **turgid** 膨胀. The...
- In a **concentrated solution**, water moves **out** of the cells. The cells lose their firmness and become soft, or **flaccid** 松软.
- **(Supplement)** If even more water leaves, the cell membrane pulls away from the cell wall. This is **plasmolysis** 质壁分离.

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



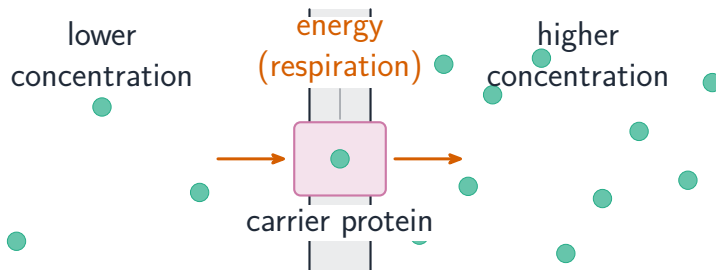
2 Active transport

Movement Into & Out of Cells
↳ Active transport

Active transport

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.



Movement Into & Out of Cells
↳ Active transport

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

3

Recap

Movement Into & Out of Cells

↳ Recap

Worked example – percentage change in mass

A potato cylinder is 5.0 g before soaking and 5.6 g after. Find the percentage change.

- Change in mass = $5.6 - 5.0 = 0.6$ g (a gain).
- % change = $\frac{\text{change}}{\text{starting mass}} \times 100$
- = $\frac{0.6}{5.0} \times 100 = +12\%$
- 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.

Movement Into & Out of Cells

↳ Recap

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

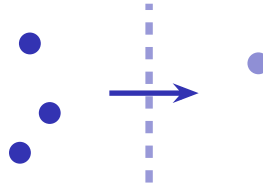
4

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