

Exercise walk-through

3.3

Active transport

IGCSE Biology

Active transport

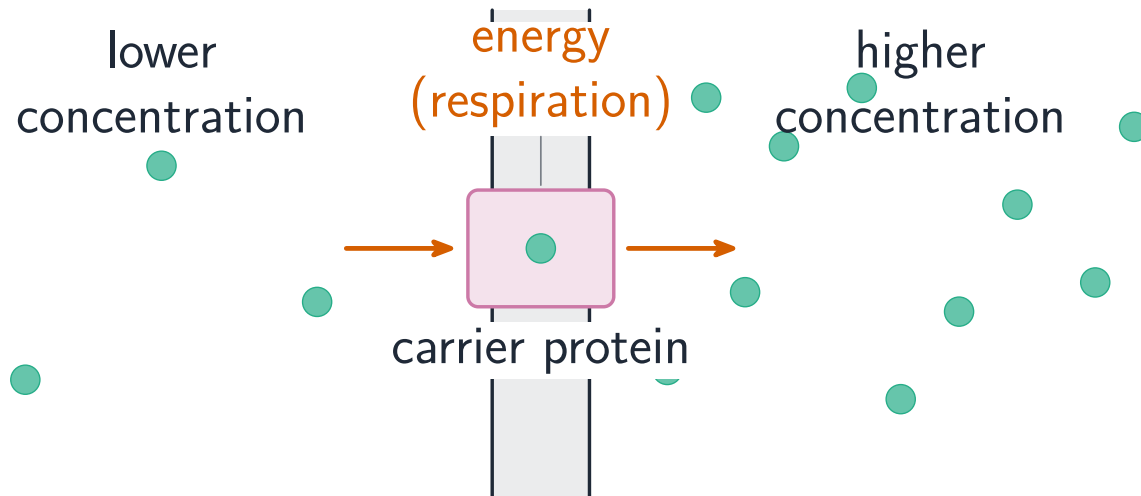
Active transport

moves particles **against** the gradient (low $\rightarrow$ high).

It needs energy from **respiration**
root hairs take up minerals.

& a **carrier protein**

– e.g.



Active transport: uphill, and it costs

Against the gradient

Movement from a **lower** to a **higher** concentration – the opposite of diffusion.

Protein carriers

Protein carriers in the membrane pick up the molecule or ion and carry it across, using energy from respiration.

Where it is used

Root hair cells taking up mineral ions from dilute soil water; the gut absorbing the last of the glucose.

The tell

Anything that stops respiration stops active transport – and stops nothing else on this list.

Three transport processes, one question to ask: is energy needed, and is a carrier protein involved?

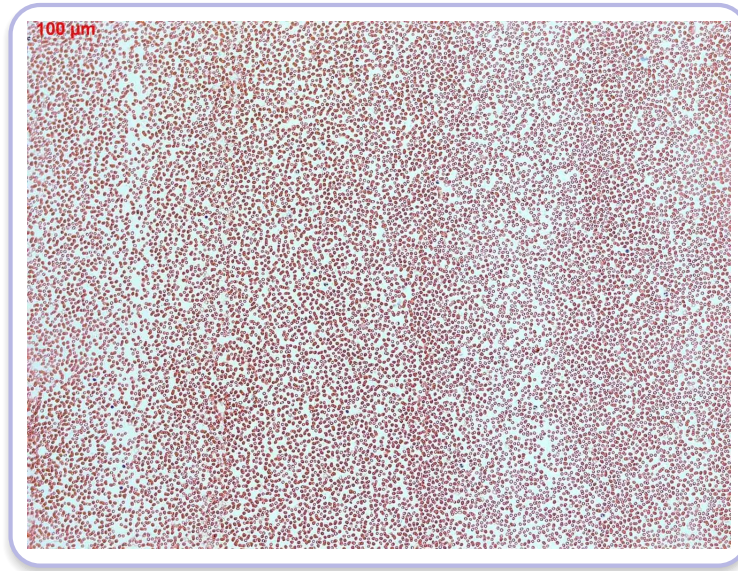
Comparing the three

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

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

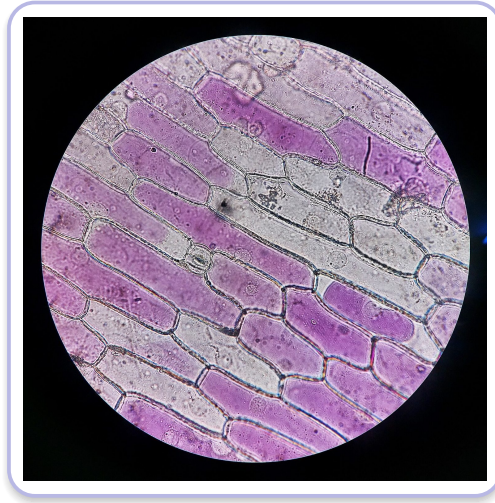
active transport – low → high (against); needs energy; ions & molecules

Osmosis, continued



Red blood cells: water moves in and out of cells by osmosis.

Osmosis and plant cells, continued



Plasmolysed red onion cells: the purple contents have pulled away from the cell walls

Exercises 2.1-2.2

2.1 Define active transport.

[2]

2.2 State the source of energy for active transport.

[1]

Exercises 2.1·2.2

2.1 Define active transport.

[2]

2.1

- movement of particles from **lower to higher** concentration (against the gradient)
 - using **energy from respiration**
-

2.2 State the source of energy for active transport.

[1]

2.2

- the energy comes from **respiration**

Exercise 3.1

3.1 Which process moves particles **against** the concentration gradient?

[1]

☐

A diffusion

B osmosis

C active transport

D evaporation

Exercise 3.1

3.1 Which process moves particles **against** the concentration gradient?

[1]

☐

A diffusion

B osmosis

C active transport

D evaporation

3.1 C

- **active transport** moves particles **against** the gradient
- A and B go down the gradient; D is not a membrane process

Exercise 3.2 (a)

3.2 Root hair cells take up mineral ions from the soil.

(a) Name the process used when the ions are more concentrated inside the cell. [1]

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(a) Name the process used when the ions are more concentrated inside the cell. [1]

(a)

- ions more concentrated inside: **active transport**

Exercise 3.2 (b)

3.2 Root hair cells take up mineral ions from the soil.

(b) Explain why this process needs energy.

[2]

Exercise 3.2 (b)

3.2 Root hair cells take up mineral ions from the soil.

(b) Explain why this process needs energy.

[2]

(b)

- the ions move **against** the concentration gradient
- which **requires energy**

Exercise 3.3

3.3 Explain the role of carrier proteins in active transport.

[2]

Exercise 3.3

3.3 Explain the role of carrier proteins in active transport.

[2]

3.3

- **carrier proteins** pick up the ions/molecules
- and carry them across the membrane **using energy**