Combined Science - Biology - KS4
Cell Biology

Active transport

(Downloadable student document)

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OAK NATIONAL ACADEMY

Recap on osmosis and diffusion

Osmosis and diffusion

Osmosis

Osmosis is the movement of water from a region of higher concentration of **water** to a region of lower concentration of **water** through a partially permeable membrane. It **does not require** energy.

Diffusion

Diffusion is the movement of particles from an area of higher concentration to an area of lower concentration. It is a passive process and therefore **does not require energy**.

Pause the video to complete your task

Quick concept check

1. Give one similarity between diffusion and osmosis.
2. Give one difference between diffusion and osmosis.

Resume once you’re finished

Answer

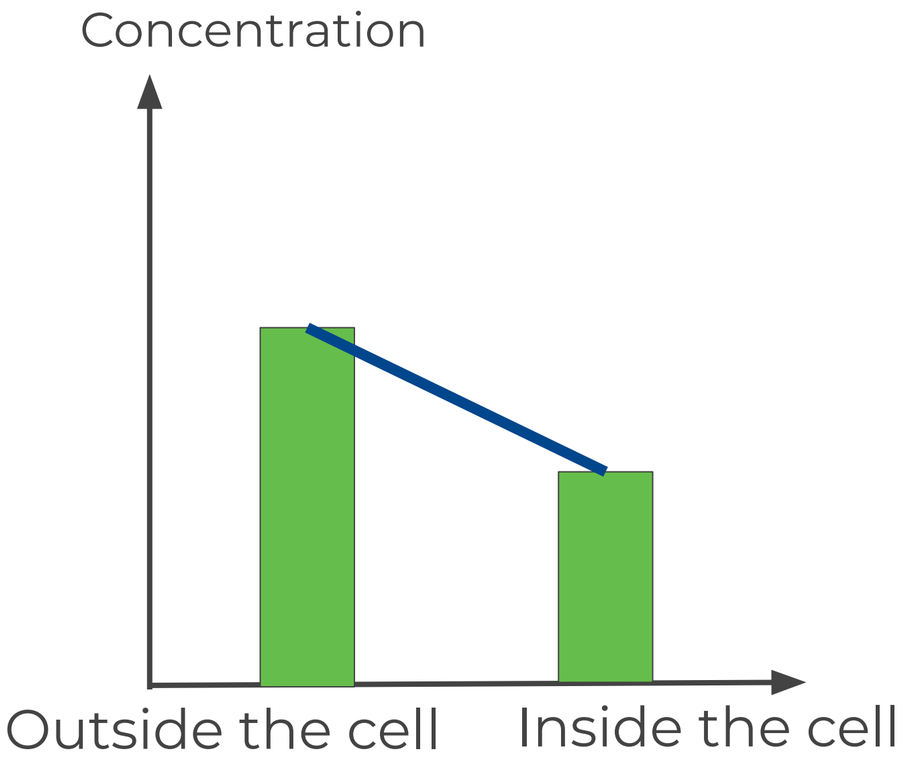
1. Both diffusion and osmosis do not require energy.

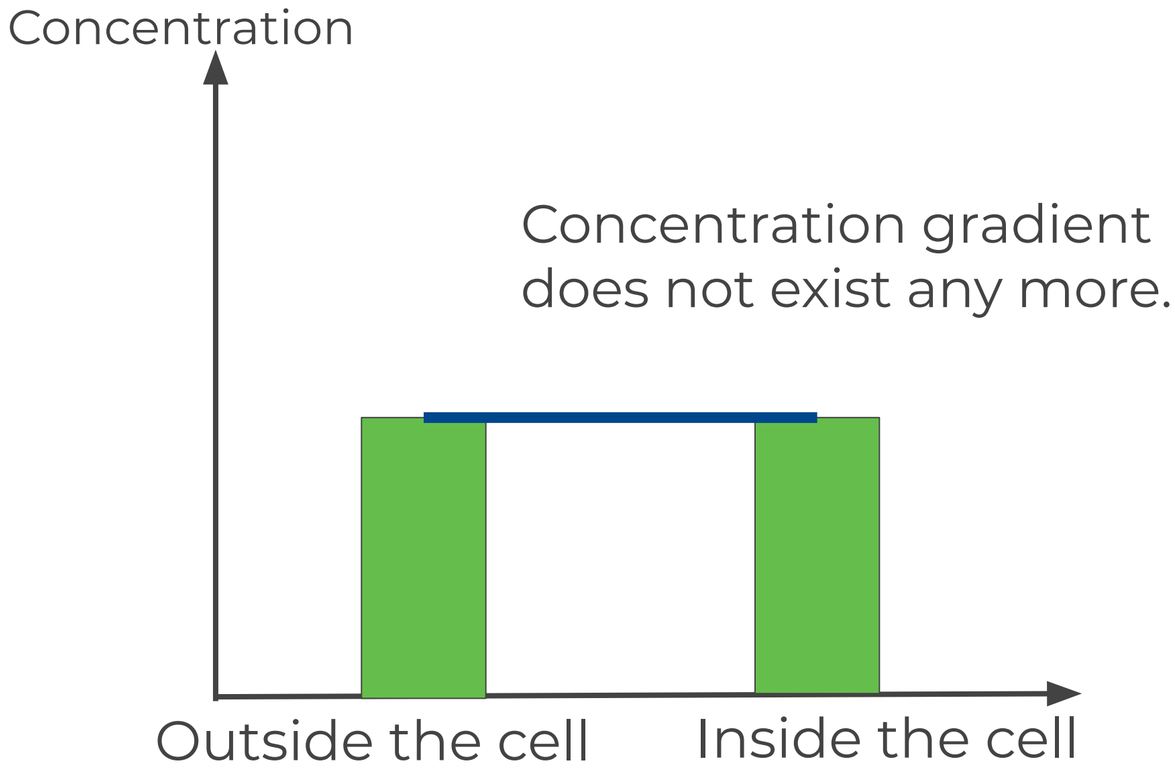
2. Diffusion can be used to describe any particles but water. Osmosis only refers to the movement of water.

Active transport

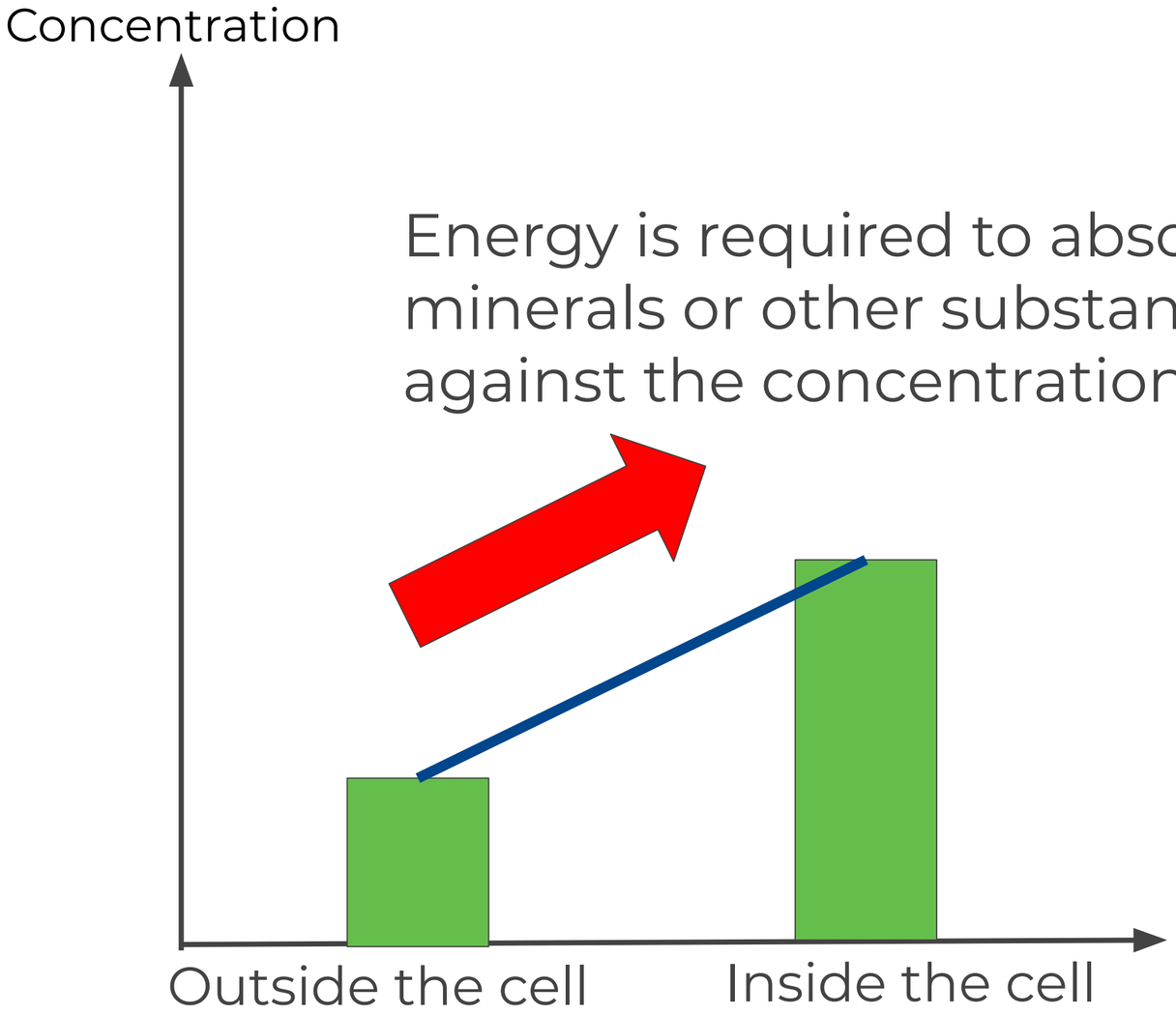
Active transport

Active transport is the movement of substances from a lower concentration to a higher concentration **across a semi-permeable** membrane **requiring energy** from respiration.





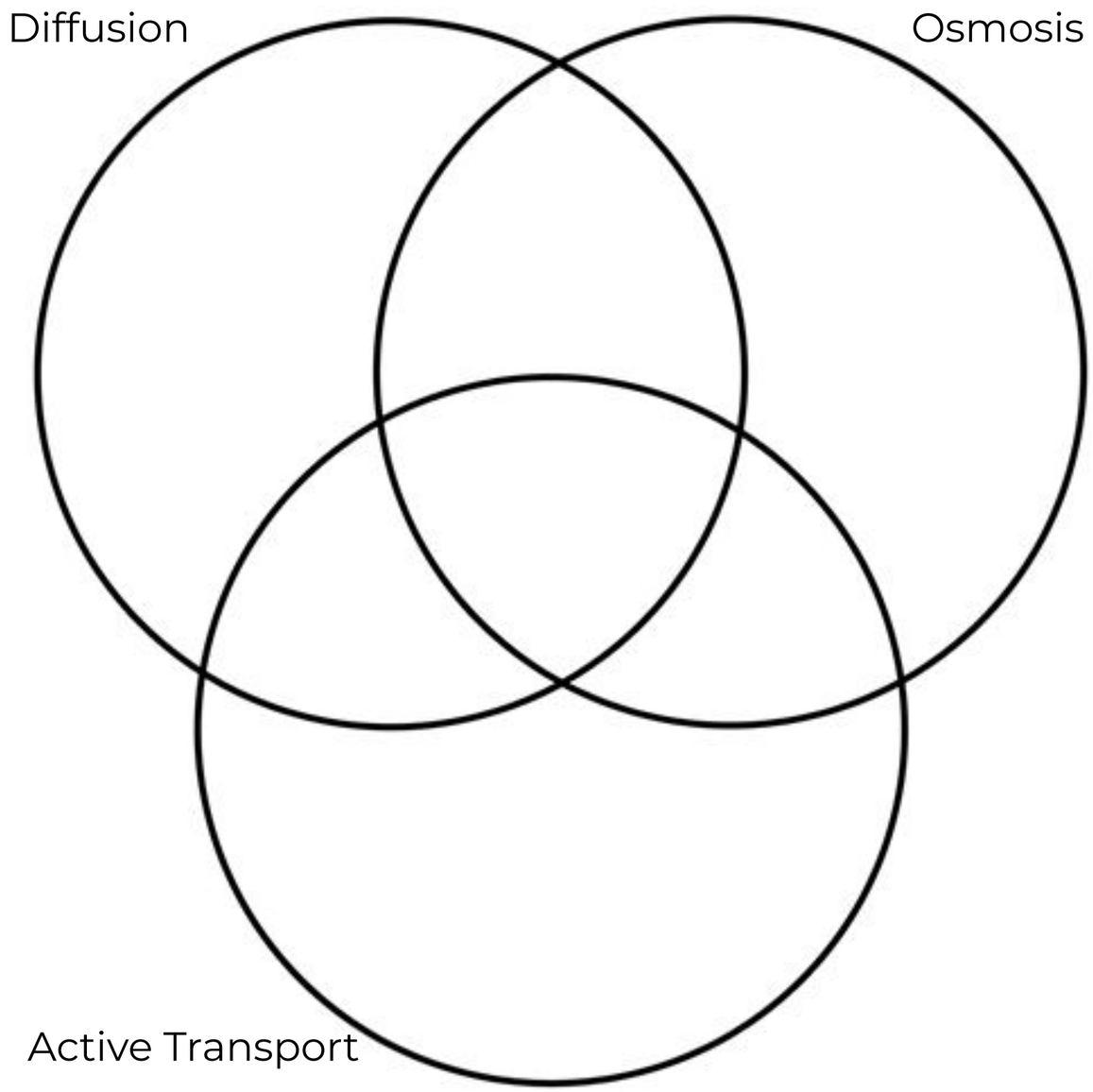
Active transport



Energy is required to absorb minerals or other substances against the concentration gradient.

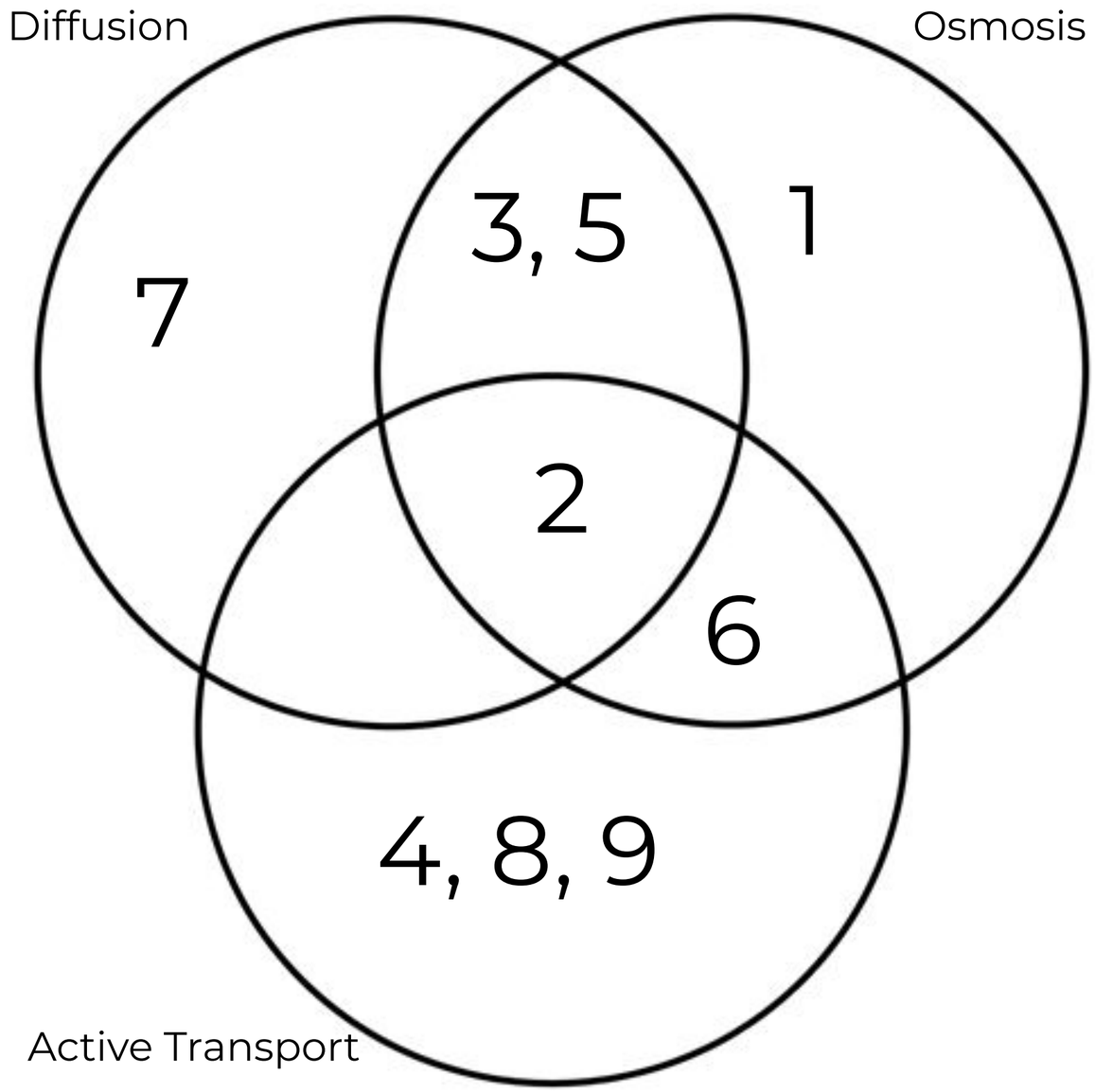
This process require energy and proteins in the cell membrane.

Transport across the membrane



1. Movement of water
2. Movement of particles
3. From a high concentration to a low concentration
4. Requires energy
5. Does not require energy
6. Requires a partially permeable membrane
7. Does not require a partially permeable membrane
8. From a low concentration to a high concentration
9. Cells that do this have a lot of mitochondria

Transport across the membrane



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Examples of active transport

Root hair cell

Root hair cells have a large surface area to absorb water and minerals. It also contains a lot of mitochondria to perform active transport.

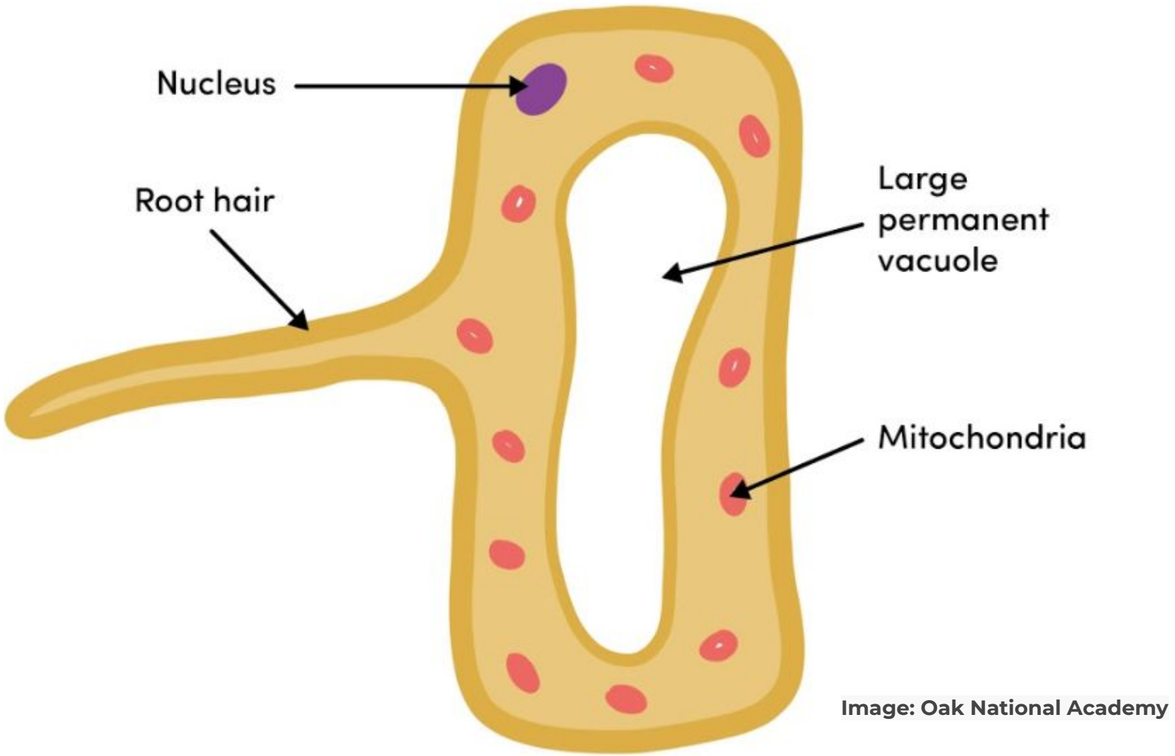

Image: Oak National Academy

Other examples of active transport

Small intestine

- Transport glucose into blood

Kidney

- Reabsorb glucose into the blood

Exam questions

Root hair cells have large numbers of mitochondria to provide lots of energy.

Why do root hair cells need lots of energy?

A For active transport of minerals.
B For active transport of water.
C For diffusion of minerals.
D For diffusion of water.

Your answer ☐

OCR, Jun 2019 J250/01 **[1]**

What is active transport? Give the definition. (2)

Give one example, other than the one mentioned above, of active transport. (1)

Answers to exam questions

Root hair cells have large numbers of mitochondria to provide lots of energy.

Why do root hair cells need lots of energy?

A For active transport of minerals.
B For active transport of water.
C For diffusion of minerals.
D For diffusion of water.

Your answer **A**

OCR, Jun 2019 J250/01 **[1]**

Active transport is the movement of substances from a lower concentration to a higher concentration **across a semi-permeable** membrane **requiring energy** from respiration.

Absorption of glucose in the villi, or reabsorption of glucose in the kidneys

Independent practice

1. What is active transport?
2. Describe how root hair cells use active transport?
3. Why is active transport important in the plant?
4. A student uses a pipette to add 3 drops of indicator to a beaker of acid. She watches the colour change and swirl through the liquid. Is this osmosis, diffusion or active transport?
5. Explain your answer to the question above.
6. Explain why cells performing active transport require a lot of energy.
7. Describe how the villi uses active transport.
8. Why is it important to have active transport in the villi?
9. The cells of the small intestine have many mitochondria. Explain why they this helps them to function properly.

Answers to independent practice

1. The movement of substances from a lower concentration to a higher concentration across a semi-permeable membrane requiring energy from respiration.
2. It allows mineral ions to be absorbed into plant root hair cells from very dilute solutions (low concentrations) in the soil.
3. Plants require ions for healthy growth (e.g. making chlorophyll, making proteins)
4. Diffusion
5. The indicator is spreading from high to low concentration and is not specifically water. There is no membrane involved.
6. Substances have to be moved against the concentration gradient and this requires energy to do so.
7. The villi in the small intestine transport glucose from the intestine at low concentration into the bloodstream where it is at higher concentration.
8. Because glucose needs to be absorbed for respiration.
9. Mitochondria release energy for the cells to use to perform active transport.