

Cambridge IGCSE Biology

CHAPTER 03

MOVEMENT IN AND OUT OF CELLS

WHOLE UNIT WORKBOOK

Cambridge IGCSE Biology 0610

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03. MOVEMENT IN AND OUT OF CELLS

The stuff you need to know in this chapter:

3.1 DIFFUSION

Core:

- Define diffusion as the net movement of particles from a region of their higher concentration to a region of their lower concentration down a concentration gradient, as a result of random movement
- Describe the importance of diffusion of gases and solutes
- State that substances move into and out of cells by diffusion through the cell membrane

Extended:

- State that the energy for diffusion comes from the kinetic energy of random movement of molecules and ions
- Investigate the factors that influence diffusion, limited to surface area, temperature, concentration gradients and distance

3.2 OSMOSIS

Core:

- State that water diffuses through partially permeable membranes by osmosis
- State that water moves in and out of cells by osmosis through the cell membrane
- Investigate and describe the effects on plant tissues of immersing them in solution of different concentrations
- State that plants are supported by the pressure of water inside the cells pressing outwards on the cell wall
- Define osmosis as the net movement of water molecules from a region of higher water potential (dilute solution) to a region of lower water potential (concentrated solution), through a partially permeable membrane
- Explain the effects on plant tissues of immersing them in solutions of different concentrations by using the terms turgid, turgor pressure, plasmolysis and flaccid
- Explain the importance of water potential and osmosis in the uptake of water by plants
- Explain the importance of water potential and osmosis on animal cells and tissues
- Explain how plants are supported by the turgor pressure within cells, in terms of water pressure acting against an inelastic cell wall

3.3 ACTIVE TRANSPORT

Core:

- Define active transport as the movement of particles through a cell membrane from a region of lower concentration to a region of higher concentration using energy from respiration
- Discuss the importance of active transport as a process for movement across membranes: e.g. ion uptake by root hairs and uptake of glucose by epithelial cells of villi and kidney tubules
- Explain how protein molecules move particles across a membrane during active transport

(Cambridge International Examinations, 2014)



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Core and Extended candidate tasks:

All content marked with an **E** symbol is for extended candidates only.

Core level students should complete all tasks except for those with the **E** symbol.

Extended level candidates should complete all question, including those with the **E** symbol.



3.1 DIFFUSION

1. Fill in the blanks to summarise diffusion

In order for substances to get into or out of a cell they passed pass across the _____. One way this can happen is by diffusion. This is a _____ process, meaning it does not require energy.

In order for things to diffuse, they must move from an area of a _____ concentration to an area of _____ concentration, which means they move down the concentration _____.

2.

a) Write the definition for "diffusion"

b) Look at your definition (2a). Explain what is meant by "random movement".

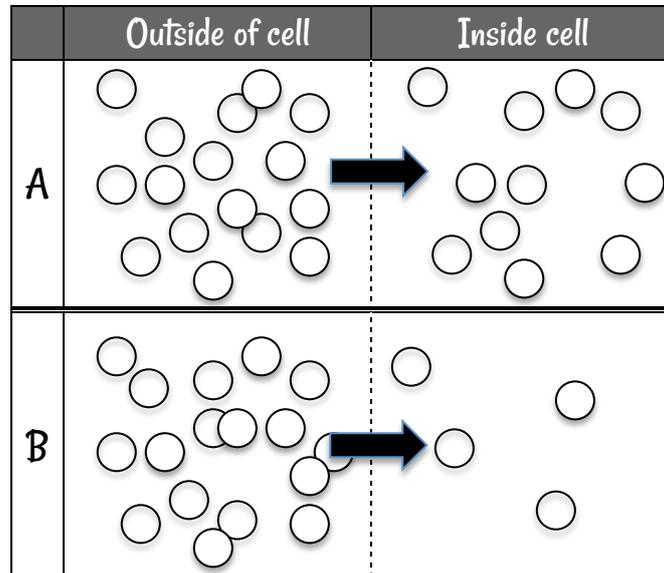
3. List four things that affect the rate of diffusion

1. _____
2. _____
3. _____
4. _____



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4. In terms of concentration gradients, state and explain the difference in rate of diffusion into the cell in scenarios A and B below:



5. Draw a diagram of an alveolus and a single blood vessel. Label the diagram to show the diffusion of gases.



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6. BONUS QUESTION: Use your diagram to help you - how many plasma membrane does an oxygen molecule pass through to get from air into a blood cell?



3.2 OSMOSIS

1. Complete the sentences to describe osmosis

osmosis is a special type of diffusion. It involves any _____
but we will focus on water. The water goes from a place where there is
a higher percentage of water to a place where there is a lower
percentage. we say it goes from an area of high _____
_____ to and area of low _____.

while diffusion can happen anywhere (like a smell moving across a room),
osmosis can only happen if a _____
membrane is there. It happens because large substances in a cell like
proteins are too _____ to fit through the membrane, but water
molecules are small enough.

In the roots of plants, water moves into the _____
_____ cells. These have a lower _____
_____ than the soil because the plant is constantly taking
water up through its stem out of the roots.

2. Write the definition for "osmosis"



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3. When cells are immersed in water, osmosis can take place. The direction of water movement, and the effect on the cells, will depend on the concentration of the solution.

The table below summarizes the effects of immersing tissue in different solute concentrations. Complete the boxes.

	Concentration of salt solution is <u>much</u> higher than cell	Concentration of salt solution is equivalent to cell	Concentration of salt solution is zero (pure water).
Water potential of cell	Cell water potential higher than solution		
Direction of movement of water		No movement	
Word to describe solution			Hypotonic
Texture of plant tissue after 15 minutes		No change	Turgid
Appearance of cell after being immersed for 15 minutes			
Animal cell diagram			



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4.

a) Animal cells can burst in hypotonic solutions. Explain why this is not true for plant cells.

b) Complete the following sentences about plant cells:

Plant cells are supported by "_____ pressure", which is pressure that results from water pushing against an inelastic (not stretchy) cell _____.

5. Explain what is meant by plasmolysis



3.3 ACTIVE TRANSPORT

1. Diffusion is "passive". State what this means.

2. Active transport, as its name implies, is "active". State what this means.

3. Write the definition for active transport.

4. What process supplies the energy for active transport? (And the energy for everything else living things do!)

5. Complete the sentences to describe some important examples of active transport.

The concentration of glucose molecules in the _____ of the small intestine is _____ than the concentration inside the intestinal villi. This means that glucose would _____ from the villi into the lumen, but this can't happen because the body needs to take in the glucose, not lose it. Instead, special _____ proteins in the cell membrane use _____ to move the glucose into the villi against its _____ gradient.

Similarly, the amount of glucose inside of the blood in the kidneys is _____ than it is in the tubule, but it must move out of the tubule. Glucose moves into the blood here by _____.



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