

WJEC (Eduqas) Biology GCSE
Topic 2.1 Transport in Cells
Questions by Topic

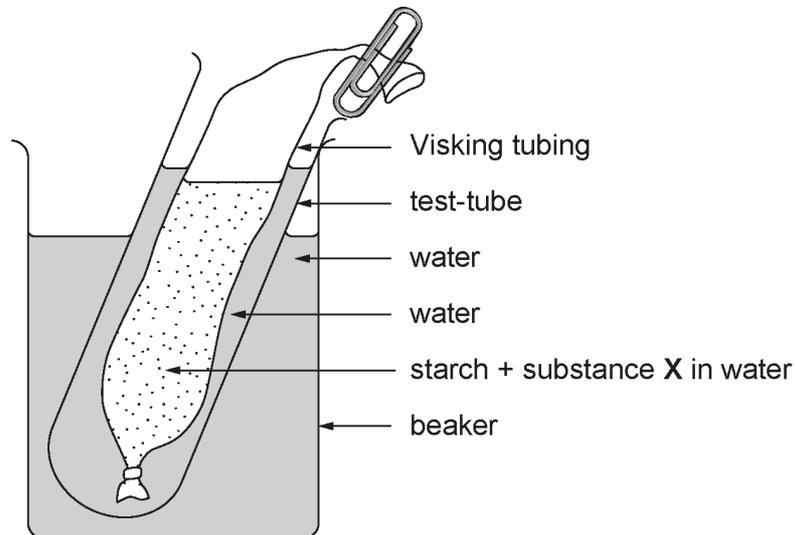
1.

(a) State the meaning of the term diffusion.

[1]

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(b) The diagram below shows a piece of Visking tubing that has been set up to represent the way molecules pass through the wall of the small intestine into the bloodstream.



Every 30 minutes for the next two hours the water in the test tube was tested for the presence of both starch and glucose.

The results are shown in the table below.

	time (minutes)				
	0 (at start)	30	60	90	120
starch	-	-	-	-	-
glucose	-	+	++	+++	++++

- substance not present
+ substance present
+++ increasing concentration of substance

(i) State why starch does not appear in the water in the test tube. [1]

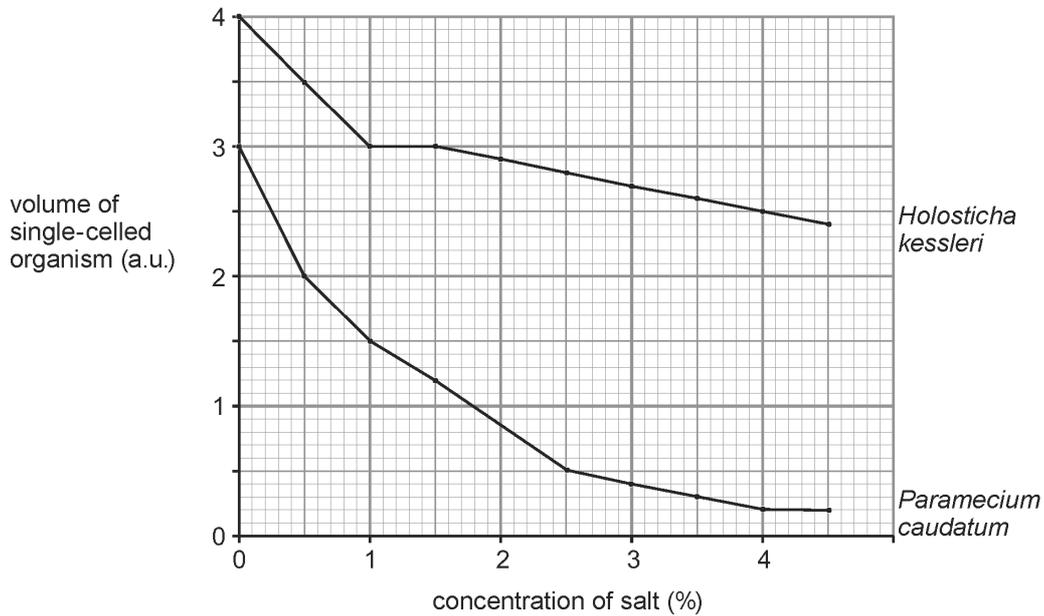
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(c) Suggest the temperature at which the reaction would work at its fastest rate by circling **one** answer below. [1]

- 0°C
- 10°C
- 35°C
- 100°C

2.

An investigation into the role of cell membranes in diffusion was carried out using two similar species of single-celled organisms, *Paramecium caudatum* and *Holosticha kessleri*. Both species were the same volume (3 a.u.) at the start of the investigation. The two species were then placed in water containing different concentrations of salt for 30 minutes. The volumes of the single celled organisms were then measured again using a microscope fitted with a microscales. The results are shown in the graph below.



(a) How do the graphs provide evidence that
 (i) *Paramecium caudatum* cannot live in sea water? [1]

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(ii) *Holosticha kessleri* normally lives in salt solutions of concentration between 1% and 1.5%? [1]

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(b) State **two** factors that should have been kept constant during this investigation for it to have been a fair comparison. [2]

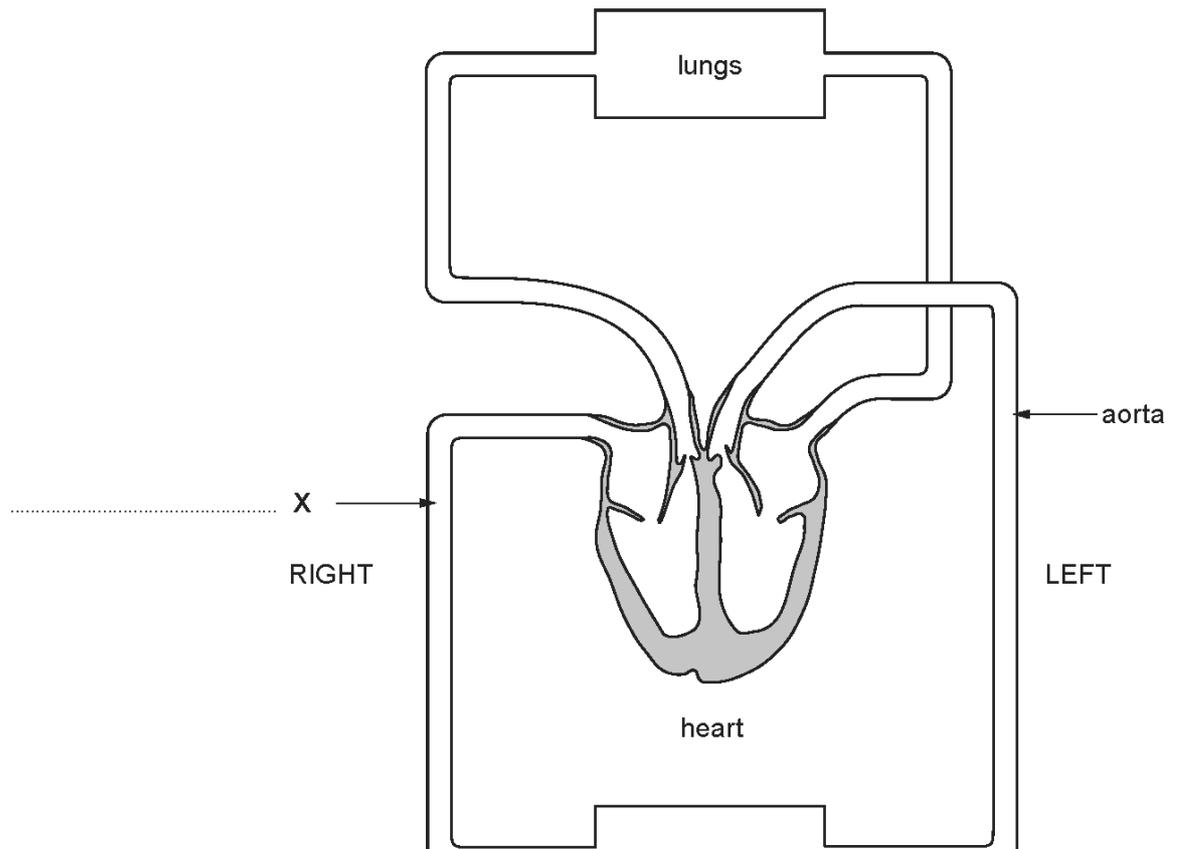
(i)
 (ii)

(c) State the name of the type of diffusion taking place and explain fully how it affects *Paramecium caudatum* in sea water. [4]

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3.

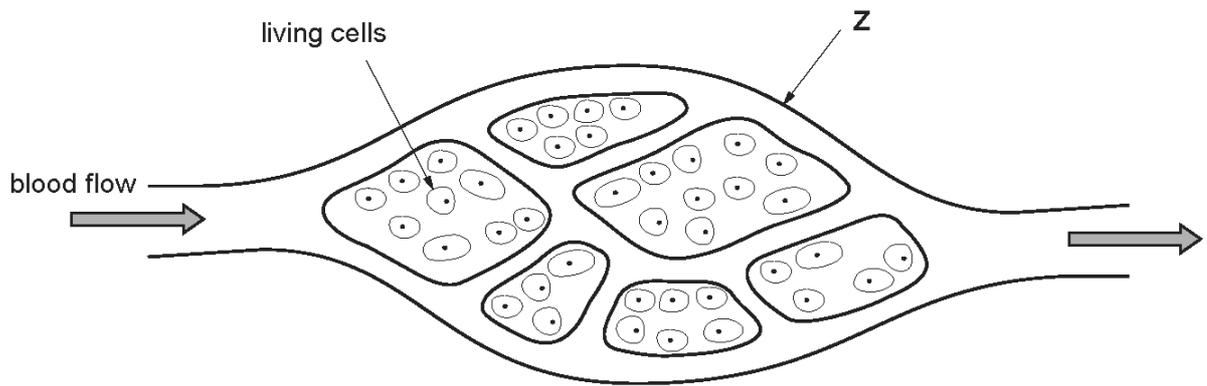
- (a) The diagram below shows the circulatory system of the human body. This is called a *double circulation*. Some structures have been labelled.



[1]

- (ii) draw arrows on the aorta and blood vessel X to show the direction of blood flow. [1]

- (b) Small blood vessels bring blood to the living cells in every organ of the body, as shown in the diagram below.



- (i) Name the type of blood vessel labelled Z. [1]

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- (ii) Explain how the structure of blood vessel Z allows substances to pass easily into and out of the living cells. [2]

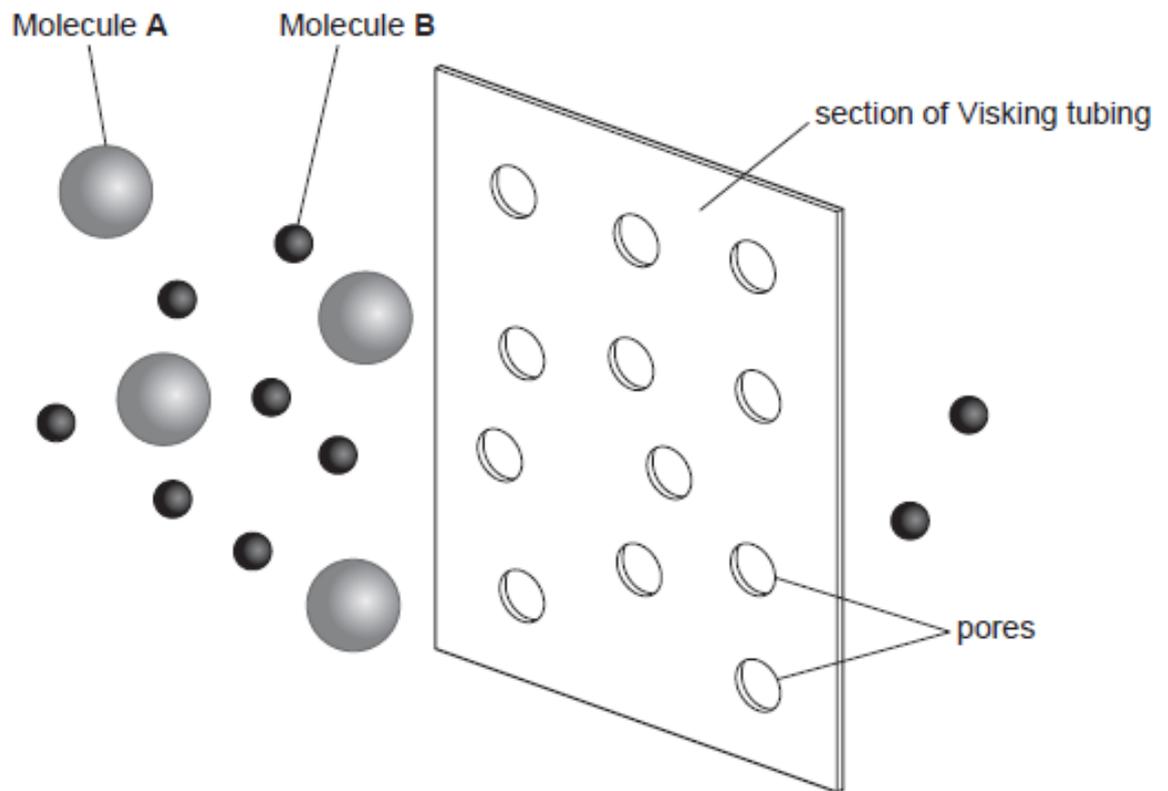
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4. (a) What is meant by the term selectively permeable membrane?

[1]

Visking tubing can be used as a model of the cell membrane.

The diagram below shows a section of Visking tubing working in the same way as a selectively permeable membrane.



Use the diagram above and your own knowledge to answer the following:

(b) (i) State the process by which molecules could pass through the Visking tubing. [1]

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(ii) Identify which molecules pass through the Visking tubing. Explain your answer. [2]

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5.

(a) State the meaning of the term diffusion.

[1]

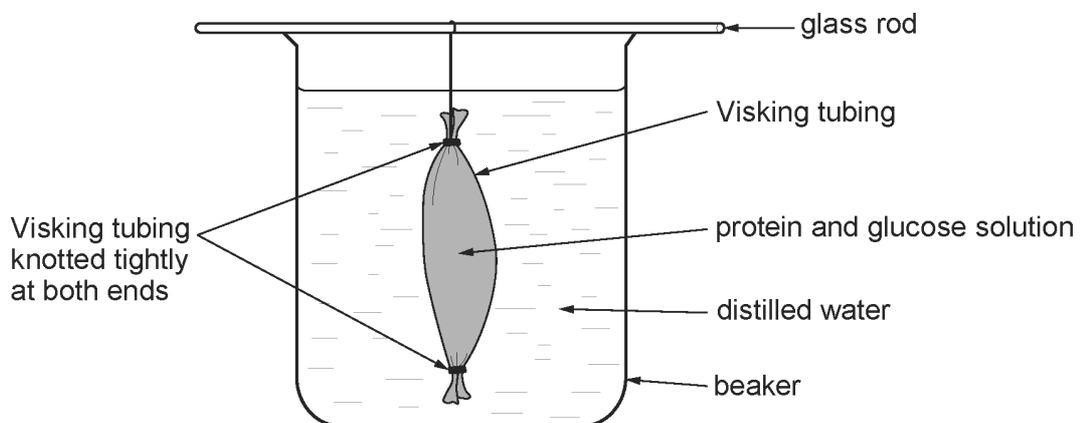
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(b) After a lesson on the properties of cell membranes a year 10 class was asked to investigate some of these properties using Visking tubing. They were given the following instructions:

- Soak a 15 cm length of Visking tubing in water to soften it.
- Tie a knot in one end of the tube.
- Fill the tube with a solution made up of protein and glucose dissolved in water.
- Tie a knot in the open end of the tube.
- Wash the tube under a stream of tap water for 15 seconds.
- Using a glass rod suspend the Visking tubing in a beaker of distilled water.



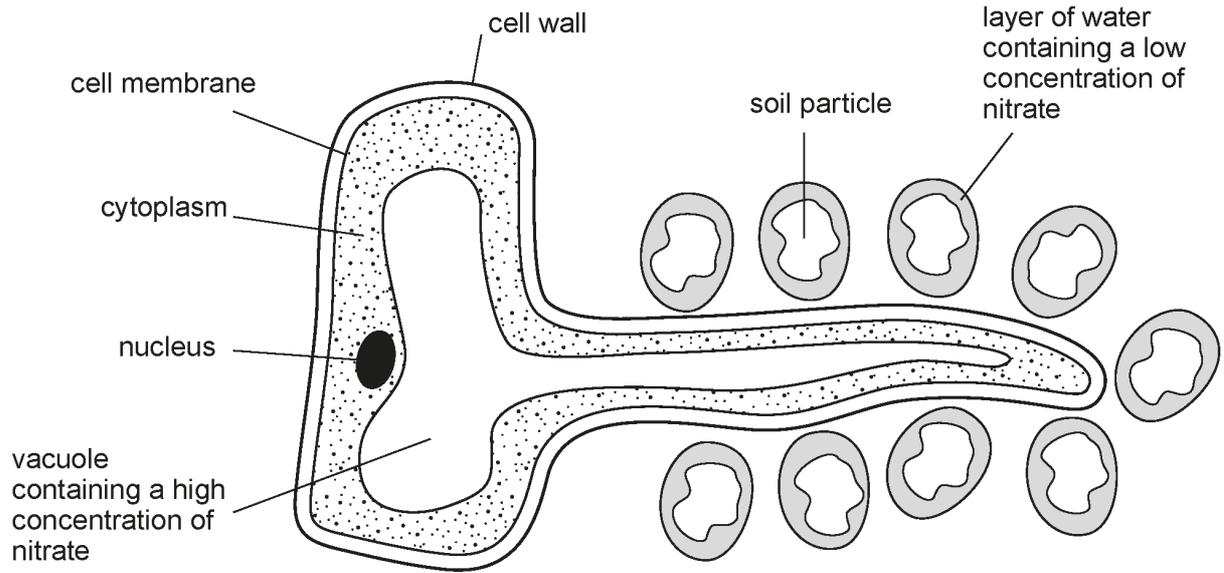
The diagram below shows how your apparatus should appear.



(i) Why were the students instructed to 'wash the tube under a stream of tap water for 15 seconds'? [1]

6.

The diagram below shows a **section** through a root hair cell in well-watered soil.



(a) State the method used by the root hair cell to take up nitrate from the soil.

[1]

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(c) Describe how the root hair cell takes up water by osmosis.

[3]

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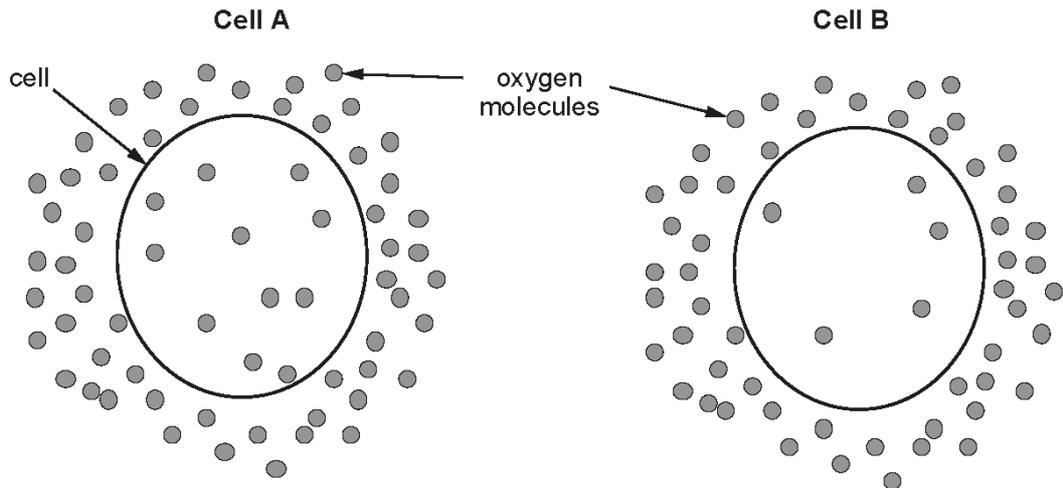
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7. (b) The diagrams below show two cells which are carrying out respiration. Oxygen molecules are shown inside and outside both cells.



- (i) Answer the following questions by placing a tick [✓] in the correct box. [3]

I. In cell A the oxygen molecules move:

- into the cell
- out of the cell
- no net movement.

II. In cell B the oxygen molecules move:

- into the cell
- out of the cell
- no net movement.

III. Into which cell could there be the greater net movement of oxygen:

- cell A
- cell B?

- (ii) Name the process by which the oxygen molecules are moving. [1]

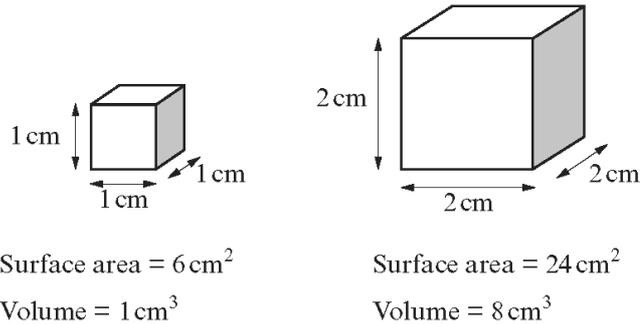
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8.

An investigation was carried out to find the effect of surface area: volume ratio on the rate of absorption in plants.

Cubes of potato were cut to the following sizes.

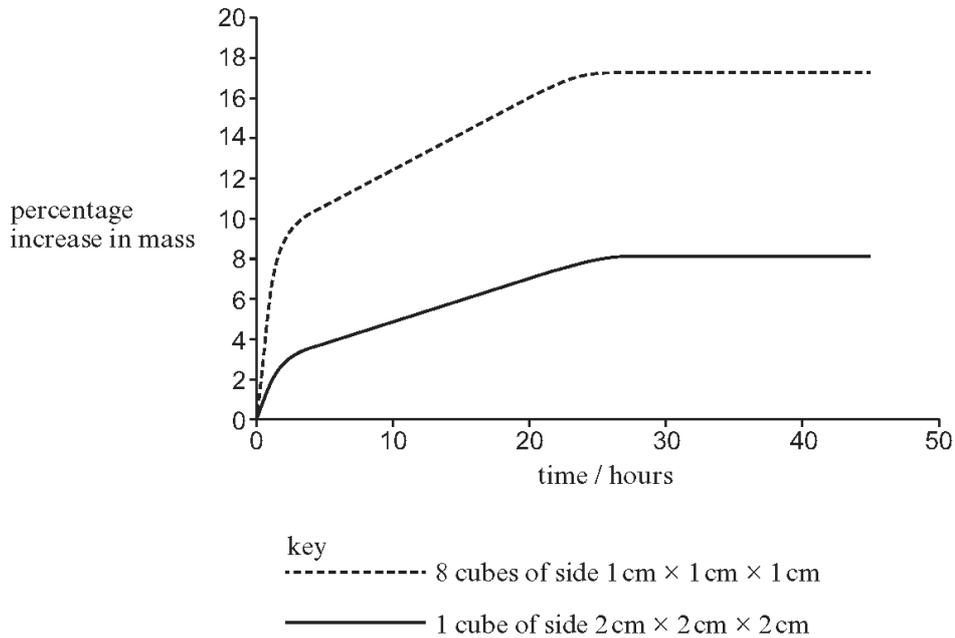


The cubes were carefully blotted dry, weighed and their masses recorded.

One cube, $2 \text{ cm} \times 2 \text{ cm} \times 2 \text{ cm}$, was put into a beaker and completely covered with distilled water.

Eight cubes, each measuring $1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$, were put into another beaker and completely covered with distilled water.

At regular intervals for a period of 45 hours, the cubes were removed from the beakers, blotted dry, reweighed and then replaced into fresh distilled water. The percentage increase in mass was measured for the eight cubes of side 1 cm and the one cube of side 2 cm . The results are shown in the graphs below.



(a) State why **eight** cubes of sides, $1\text{ cm} \times 1\text{ cm} \times 1\text{ cm}$ were used in this investigation. [1]

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(b) (i) Name the process which caused the cubes to gain mass. [1]

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(ii) Describe the process by which the cubes of potato gained mass. [3]

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(iii) Use the evidence gained by the investigation to describe the importance of root hairs in the absorption of water from the soil. [3]

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(c) Name the process by which mineral salts are absorbed into the roots of plants. [1]

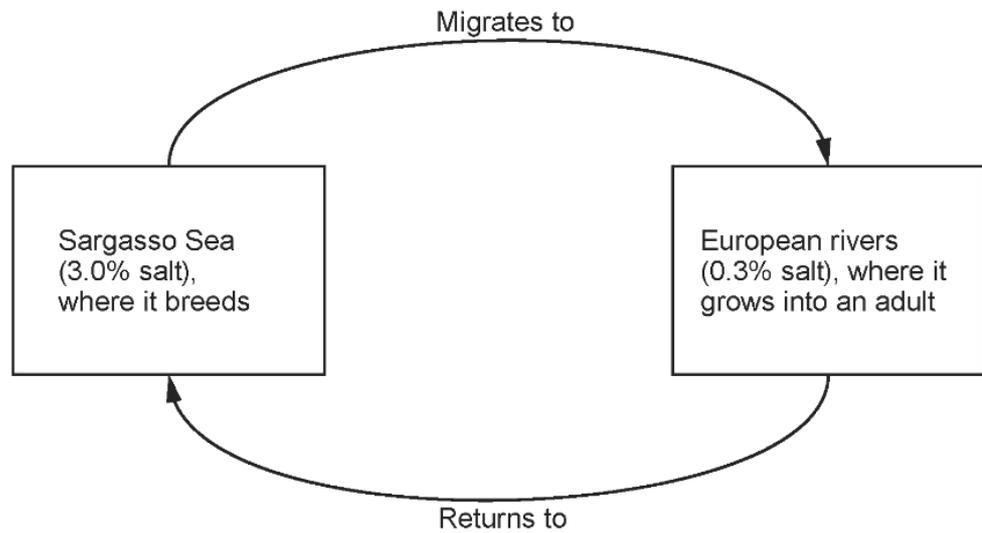
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9.

The common eel (*Anguilla anguilla*), spends some of its life in fresh water and some of its life in sea water. It breeds in the Sargasso Sea near Central America and migrates to European rivers where it becomes an adult. After several years, it becomes sexually mature and returns to the Sargasso Sea to breed.



Life cycle of the common eel



(a) Explain why osmosis could be a problem to the eels when they return from fresh water (0.3% salt) to sea water (3.0% salt). [3]

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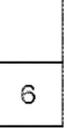
(b) Eels are able to absorb salt against a concentration gradient.

Name the process responsible for this and the **two** chemicals that are needed for the process. [3]

Name of process

Chemicals 1

2

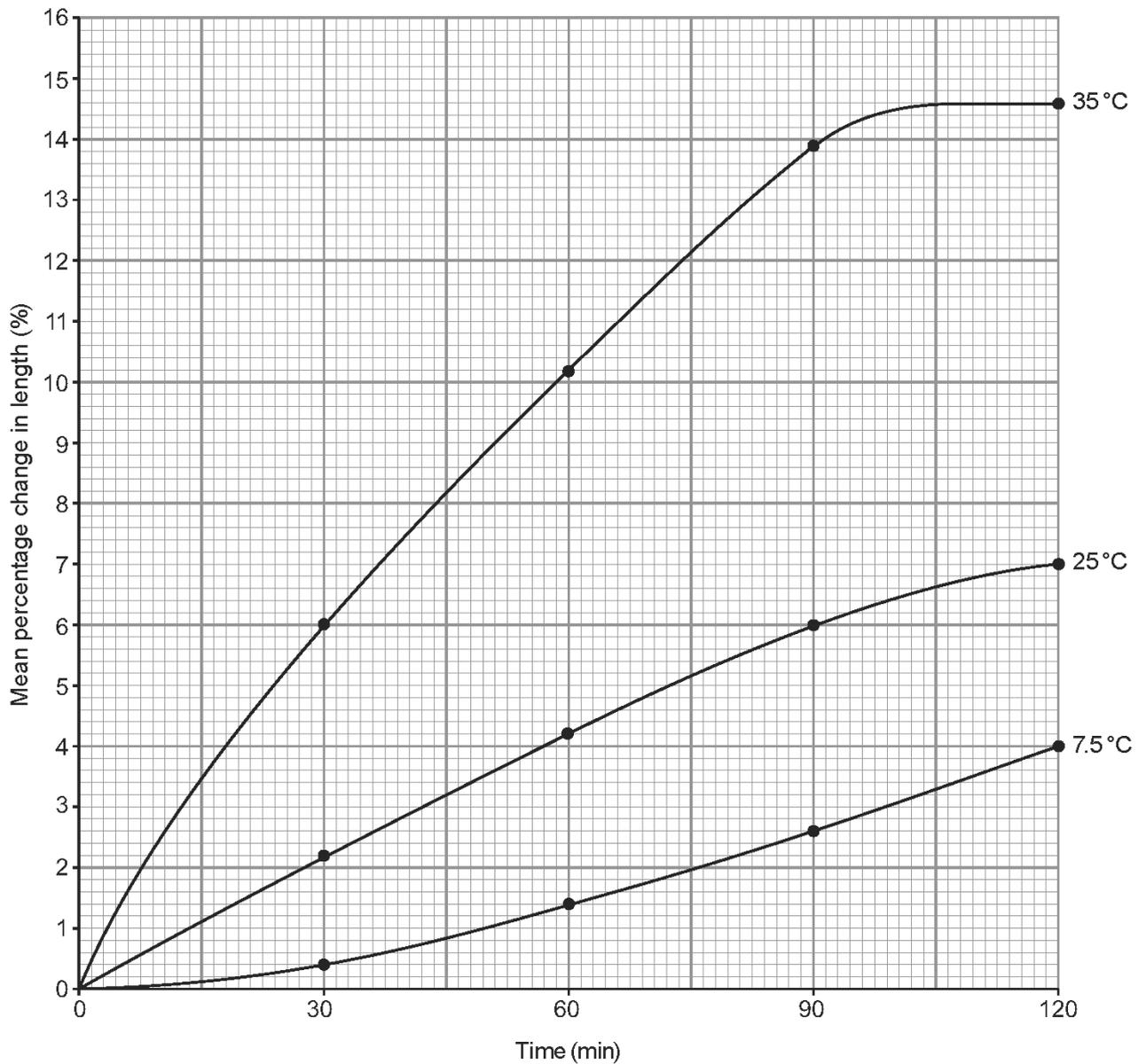


10.

Five identical cylinders of potato were placed in water at each of the following temperatures: 7.5°C, 25°C and 35°C.

After 30 minutes, they were removed and the length of each cylinder measured. This was repeated every 30 minutes for 120 minutes.

The mean percentage change in length for the cylinders was plotted on the graph below.



(a) Explain why the cylinders increased in length and name the process involved.

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(b) Suggest why at 60 minutes the percentage increase in length of the cylinders at 35°C is greater than the increase in length at 25°C. [1]

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(c) The cylinders at 35°C have reached their maximum length by 120 minutes. State how this length is maintained. [1]

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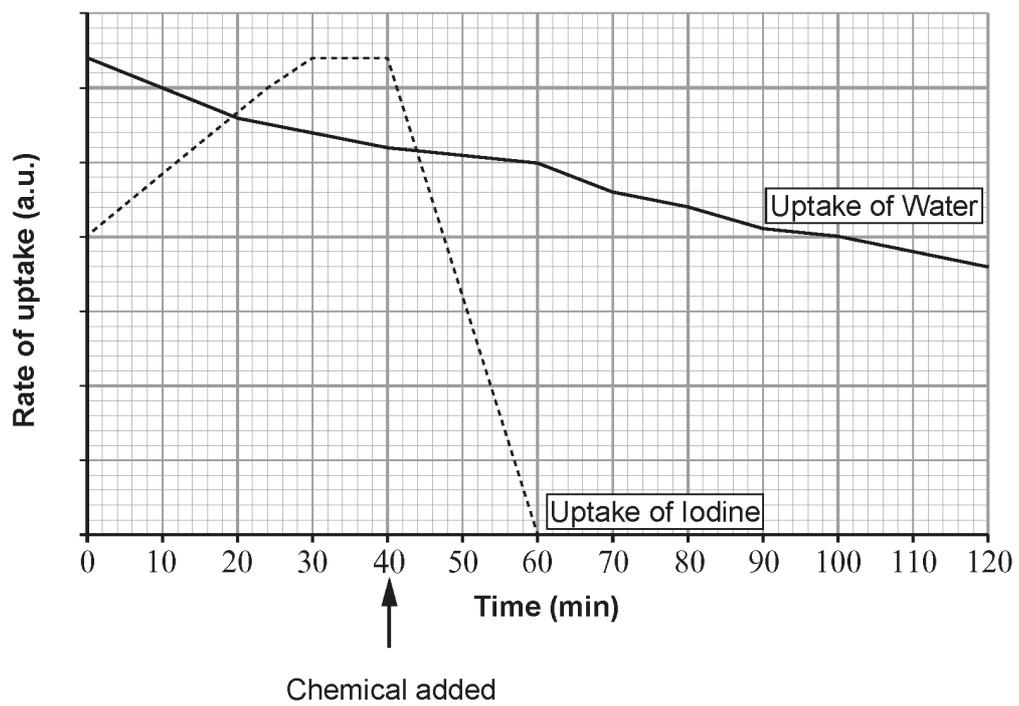
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11.

Kelp, *Laminaria digitata*, is an alga which lives in the sea.



The graph below shows the rate of uptake of water and iodine from sea water into kelp in a laboratory.



At forty minutes, a chemical was added to the sea water which stopped respiration taking place in the cells of the kelp.

(ii) Explain the effect of adding the chemical on the uptake of iodine. [3]

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(b) What process is responsible for the uptake of the water? [1]

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13.

- Certain micro-organisms can grow in stored food and may cause the food to spoil.
- Micro-organisms can only grow when they can take in enough water from the food by a type of diffusion.

(a) Name this type of diffusion and describe how the micro-organism takes in water. [3]

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In the food industry the amount of available water in food is called 'water activity'. Pure water has a water activity of 1.0.

Table 1 below shows the water activity of some foods.

Table 1

Food	Water activity
uncooked fish	0.96
fish covered in salt	0.30
strawberry jam	0.83

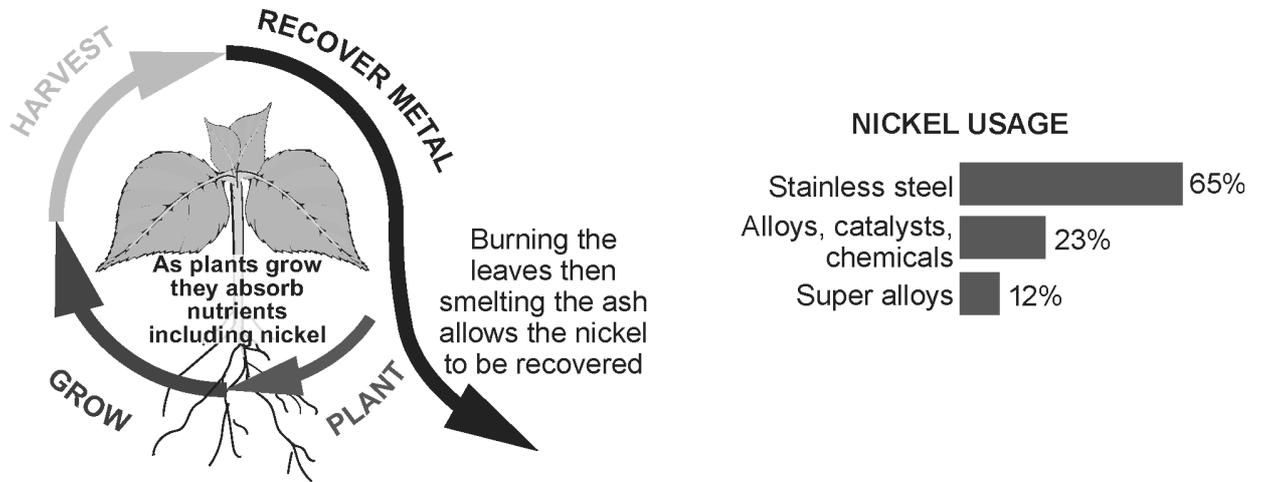
Table 2 below shows the lowest water activity at which three different types of micro-organisms can survive.

Table 2

Micro-organism	Lowest water activity at which micro-organisms can survive
bacteria	0.95
yeasts (fungi)	0.85
moulds (fungi)	0.70

14.

Some plants can be used to extract metals from the soil as an alternative to mining. Toxic, heavy metals such as nickel can be removed by some plants in this way.



(a) On the island of Palawan in the Philippines, a plant called *Phyllanthus balgooyi* grows on soil containing 0.1% nickel but its cell sap contains 9.0% nickel.

(i) How many times is the nickel in the cell sap of *Phyllanthus balgooyi* more concentrated than in the soil? [1]

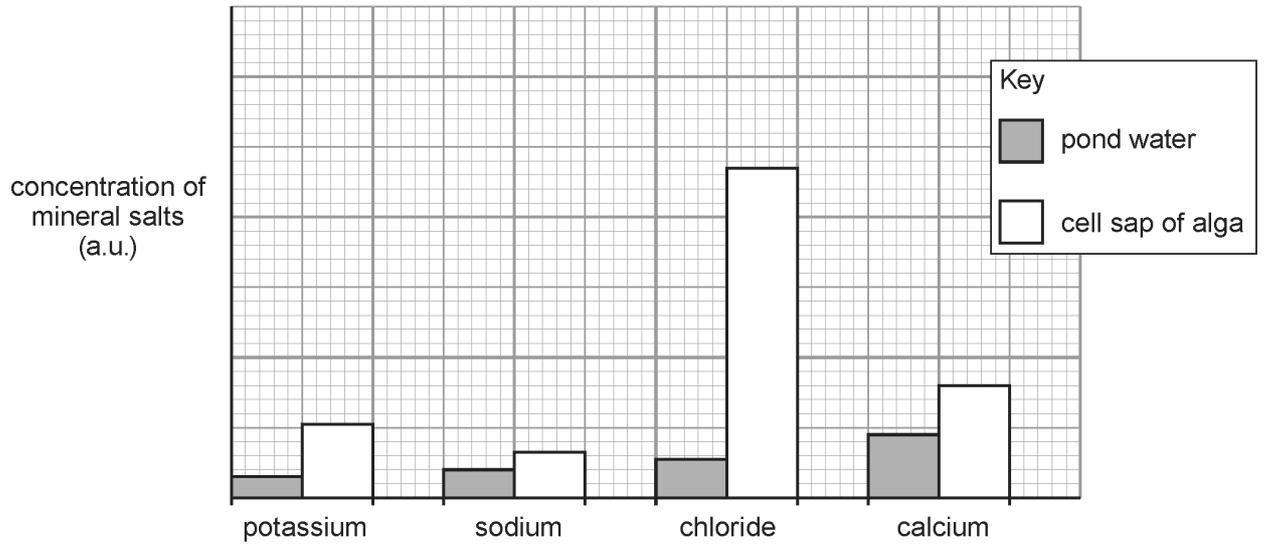
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(ii) Name, and describe the process by which the plant concentrates nickel in its cell sap. [3]

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15.

The bar chart shows the relative concentrations of different mineral salts in the cell sap of a green alga and in the pond water in which it lives.



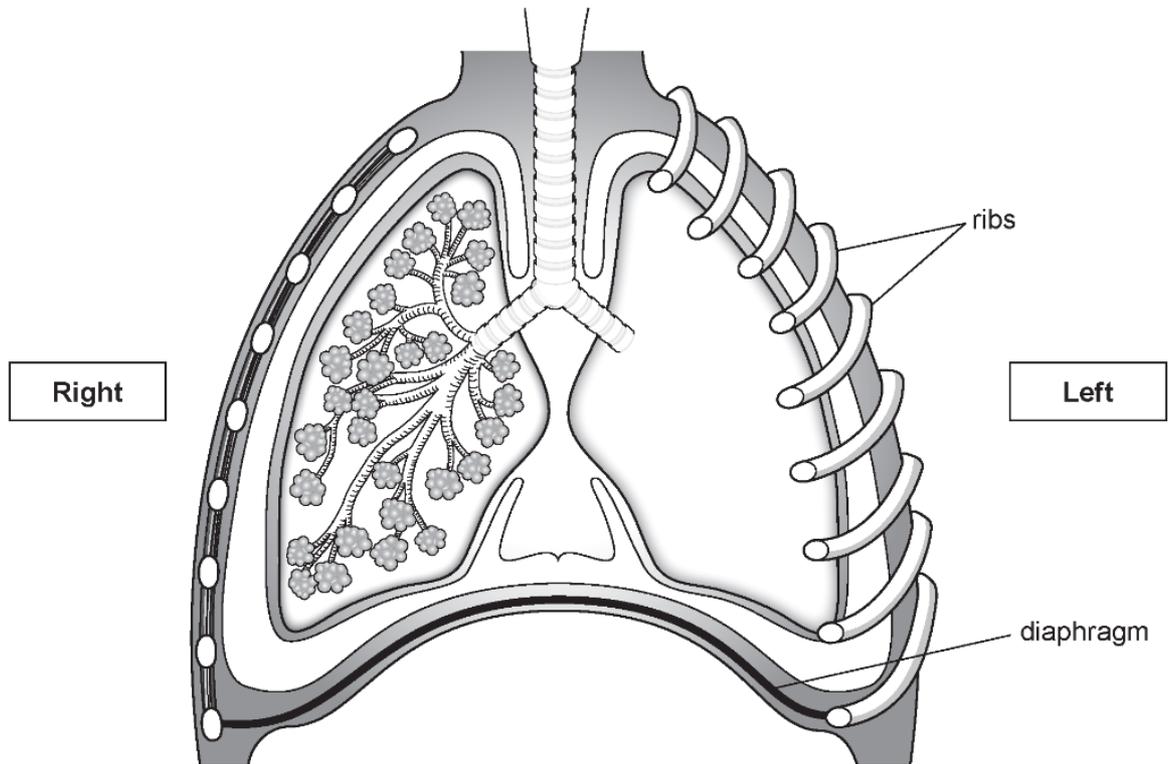
(a) Explain how the alga obtains the mineral salts from the pond water. [2]

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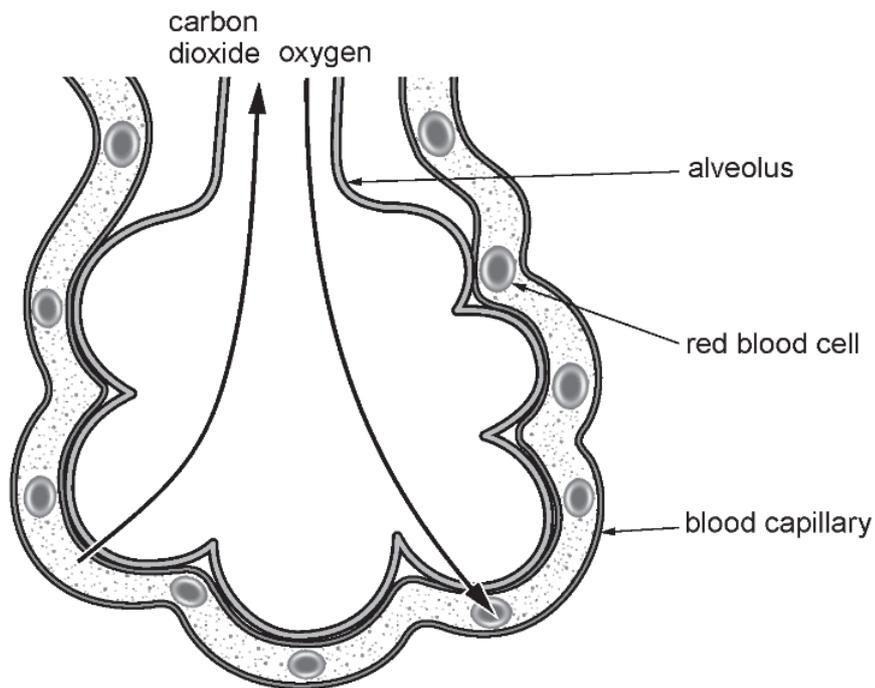
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16. (a) The diagram below is a section through the human thorax during expiration (breathing out).



(b) The diagram below shows a single alveolus.



Gas exchange between the alveolus and the blood in the capillary occurs through the wall of the alveolus.

Answer the following questions using information from the alveolus diagram above and your own knowledge.

- (i) Name the process by which gas exchange occurs. [1]

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- (ii) Describe **two** ways in which the structure of the alveolus is adapted for this function. [2]

1.

2.