

GCSE Biology A (Gateway)

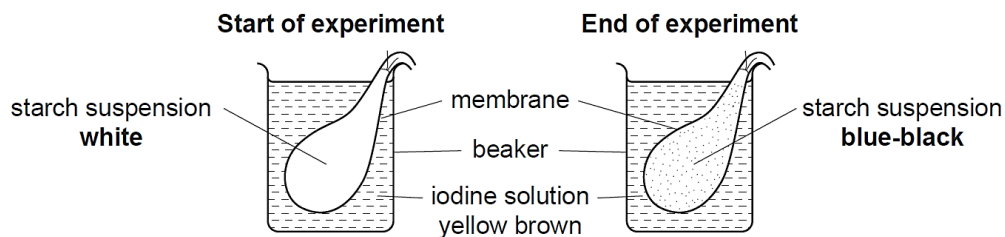
J247/03 B1-B3 and B7 Higher (Higher Tier)

Question Set 16

1 (a)

An experiment is set up to investigate how substances move into and out of cells.

Look at the results.



Explain the results of this experiment.

Use ideas about molecules in your answer.

Iodine molecules are small enough to pass through the partially permeable membrane. Starch molecules are too large so cannot cross. Iodine molecules diffuse from an area of higher concentration (iodine solution) to an area of lower concentration (starch suspension) down their concentration gradient. The reaction of iodine molecules with starch molecules produces a blue-black solution. [3]

(b)*

Sodium ions help regulate the balance of water between the blood and body cells.

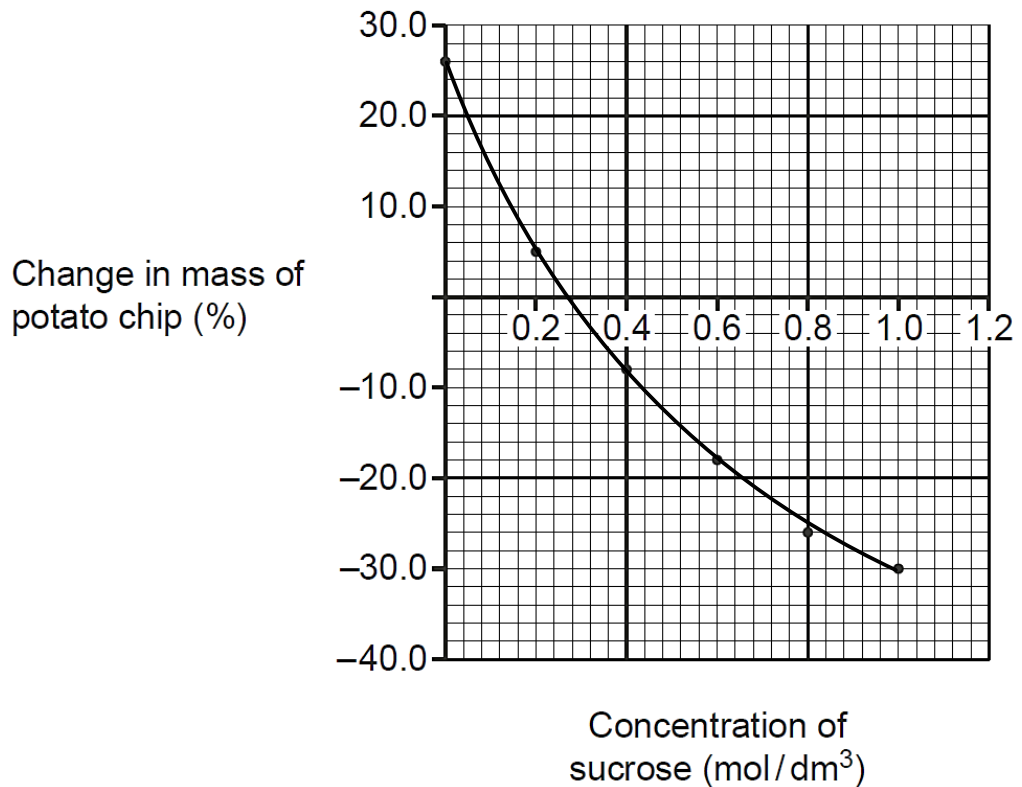
In some people the level of sodium ions in the blood can become very low. This can alter the balance of water between the blood and body cells. Doctors can prescribe drugs for patients who have this condition.

Explain how low sodium ion levels in the blood will affect the cells of the body and suggest why drugs that block the action of ADH can treat this condition.

Tissue fluid surrounds cells. Osmosis is the net movement of water molecules from an area of high water concentration to an area of low water concentration, across a partially permeable membrane. Sodium ion levels in the blood are normally controlled so that the concentration of sodium ions inside cells is the same as in the tissue fluid surrounding them. If sodium ion levels in the blood are low, the tissue fluid will be less concentrated than the fluid inside body cells. There will be a net movement of water molecules into cells by osmosis. The cells may swell and burst, lysis. ADH is a hormone that increases the permeability of nephrons to water. Drugs that block the action of ADH reduce the absorption of water into the blood by the kidney. This reduces the volume of water in the blood, countering the effect of low sodium ion levels. The tissue fluid will become more concentrated, reducing the concentration gradient for the diffusion of water into cells by osmosis ∴ less water will enter body cells. [6]

(c) Plant cells are also affected by osmotic conditions.

Look at the graph. It shows the percentage change in mass of potato chips in different concentrations of sucrose.



(i) Draw a curve of best fit on the graph. [1]

(ii) Use the graph to estimate the concentration of sucrose that has the same water potential as the potato cells. **0.27 mol/dm³** [1]

(iii) In a different experiment, a sucrose concentration of 0.0 mol / dm³ increases the mass of a carrot chip by 30%.

The carrot chip shows a 10% decrease in mass compared with its original mass for every 0.2 mol/dm³ increase in sucrose concentration.

Calculate the x-axis intercept for the carrot chip.

x-axis intercept =**0.6**.....mol/dm³ of sucrose [1]

(d) Osmotic conditions can increase the size of plant tissue but stem cells are responsible for growth of new cells.

What name is given to plant tissue that contains stem cells?

Meristematic tissue [1]

Total Marks for Question Set 16: 13

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