

AS Level Biology A
H020/01 Breadth in Biology

Question Set 16

1. A student investigated the effects of different solutions on pieces of potato tissue. Six potato rods were prepared with a cork borer. The student trimmed them to a length of exactly 5 cm.

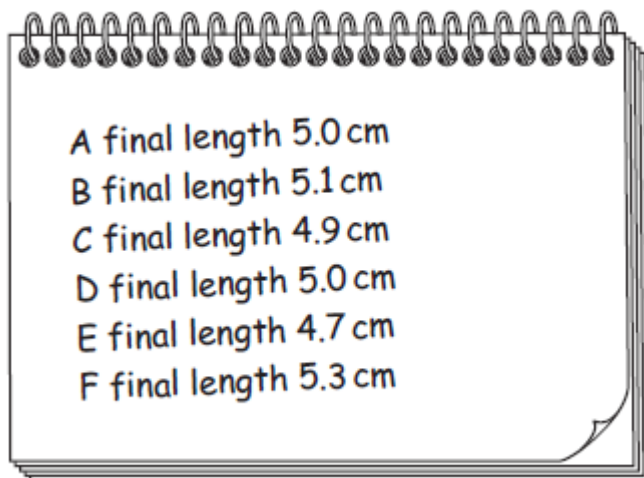
After treatment, the six rods were placed in test tubes and submerged in either sucrose solution or distilled water.

The treatment and liquid added to each potato rod is shown in Table 21 below.

Potato rod	Treatment	Liquid added
A	boiled in water for 5 minutes	1 mol dm ⁻³ sucrose solution
B	boiled in water for 5 minutes	distilled water
C	soaked in ethanol for 5 minutes	1 mol dm ⁻³ sucrose solution
D	soaked in ethanol for 5 minutes	distilled water
E	untreated	1 mol dm ⁻³ sucrose solution
F	untreated	distilled water

Table 21

After 30 minutes, the rods were removed from the tubes and their lengths measured. The student recorded the results on a piece of scrap paper, shown below.



- (a) In the space below, present the student's results in an appropriate format.

Potato rod	Length (cm)		
	Initial	Final	Change
A	5.0	5.0	0.0
B	5.0	5.1	0.1
C	5.0	4.9	-0.1
D	5.0	5.0	0.0
E	5.0	4.7	-0.3
F	5.0	5.3	0.3

- (b) (i) Explain how the treatment results in the difference in the final lengths of rod A and rod E. [2]

The boiling of rod A results in the denature of plasma membrane proteins in potato cells. The structure of the plasma membrane is disrupted and it becomes fully permeable. Osmosis cannot take place, thus rod length does not change. Rod E is not boiled so cell membranes remain unchanged. Osmosis can still take place so water leaves the cells (higher Ψ) and the rod decreases in length.

- (ii) Explain how the treatment results in the difference in the final lengths of rod D and rod F. [2]

Rod D is soaked in ethanol, a non-polar solvent which interacts with and dissolves non-polar substances such as lipids in the plasma membrane of potato cells. The phospholipid bilayer is disrupted and becomes permeable. Osmosis cannot take place, thus rod length does not change. Rod F is untreated so cell membranes remain unchanged. Osmosis can still take place so water enters the cells (lower Ψ) and the rod increases in length.

- (c) State how the student could reduce the uncertainty of their data. [1]

Repeat the measurements (e.g. three times) and calculate the mean changes in lengths.

Total Marks for Question Set 16: 8

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