

Biology Paper 3

[4551/3]

Answer **all** questions.

1. An experiment was carried out to determine the concentration of sucrose solution which is isotonic to the cell sap of potato strips.

- Step 1 : A cork borer is used to obtain four cylindrical potato strips and each strip was cut at 5 mm long.
- Step 2 : The potato strip was wiped dry with tissue paper and weighed individually.
- Step 3 : Each strip was immersed in petri dish containing different concentration of sucrose solution.
- Step 4 : After 30 minutes ,the potato strips were removed and wiped dry again.
- Step 5 : The final mass of each potato strip was weighed and then recorded.

Diagram 1 shows the initial mass for each potato strip.

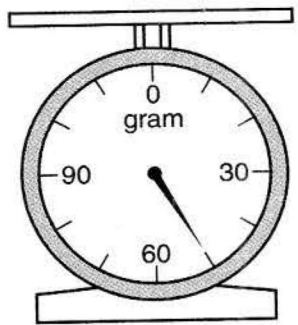


Diagram 1

Initial mass of potato strip : _____ g

Table 1 shows the results of this experiment.

Concentration of sucrose solution	Final mass of potato strip after 30 minutes/g
0.2M	
0.4M	
0.6M	
0.8M	

Table 1

(a) (i) Record the initial mass of potato strip in the space provided in Diagram 1.

(ii) Record the final mass of potato strip in the boxes provided in Table 1.

[3 marks]

(b) (i) State **two** different observations made from Table 1.

Observation 1:

Observation 2:

[3 marks]

(ii) State the inferences from the observation in 1(b)(i).

Inference from observation 1:

Inference from observation 2:

[3 marks]

- (c) Complete Table 2 based on this experiment.

Variable	Method to handle the variable
Manipulated variable	
Responding variable	
Constant variable	

Table 2

[3 marks]

- (d) State the hypothesis for this experiment.

[3 marks]

- (e) (i) Construct a table and record all the data collected in the experiment.

Your table should have the following titles:

- concentration of sucrose solutions
- initial mass of potato strips
- final mass of potato strips
- percentage change in mass of potato strips

[3 marks]

- (ii) Use a graph paper to answer this question. Using the data in 1(e)(i), draw a graph to show the relationship between the percentage change in mass of potato strips and the concentration of the sucrose solutions.

[3 marks]

- (f) Based on the graph in 1(e)(ii), state the concentration of the sucrose solution which is isotonic to the concentration of the cell sap of the potatoes. Explain your answer.

[3 marks]

- (g) State the operational definition for osmosis.

[3 marks]

- (h) The potato strip from 0.6M sucrose solution was taken out and was dried with tissue paper. Then it was immersed in distilled water for 30 minutes. Based on the results of this experiment, predict what will happen to the potato strip. Explain your prediction.

[3 marks]

- (i) In another experiment, it was found that a mustard stem strip that was immersed in 0.8% sodium chloride solution did not undergo change in mass.
The following solutions are used in this experiment.

*0.25% sodium chloride solution, 0.8%
sodium chloride solution,
1.10% sodium chloride solution*

Classify the above solutions into Table 3.

Solution concentrations(%)	Types of solution compared to the osmotic concentration of cell sap

Table 3

[3 marks]

2. Growth in organisms is permanent and irreversible. It involves in an increase in the mass and size of the organism. Growth of an organism can be measured by using certain parameter for examples heights, length, fresh mass, dry mass and volume.

Based on the given information, design an experiment to study the relationship between the growth of maize plants and time/days/ duration after planting at a nursery site.

The planning of your experimental must include the following aspects:

- Problem statement
- Hypothesis
- Variables
- List of apparatus and materials
- Experimental procedures or methods
- Presentation of data

[17 marks]

END OF QUESTIONS PAPER