Osmosis in plant tissue

Biology required practical | AQA Combined Science 8464 and AQA GCSE Biology 8461 | 14 questions, 36 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ / 36

Aim: To find out how the concentration of a sugar solution affects the change in mass of potato pieces, caused by osmosis.

Equipment: potato; cork borer and white tile; scalpel; ruler marked in mm; sugar solutions of different concentrations and distilled water; boiling tubes and a test tube rack; measuring cylinder; top-pan balance reading to 0.01 g; paper towels; forceps; marker pen and timer.

Results

Mateusz cut six potato cylinders and placed one in each sugar solution for 24 hours. He measured the mass of each cylinder before and after on a balance reading to 0.01 g.

Concentration of sugar solution in mol/dm^3	Mass at start in g	Mass at end in g	Percentage change in mass
0.0	2.48	2.93	+18.1
0.2	2.55	2.70	X
0.4	2.61	2.51	-3.8
0.6	2.50	2.43	-2.8
0.8	2.44	2.03	-16.8
1.0	2.57	2.06	-19.8

Questions

1 Name the independent variable and the dependent variable in Mateusz's investigation. (2 marks)

2 Mateusz used a cork borer and cut every cylinder to the same length. Explain why the cylinders needed to be the same size. (2 marks)

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3 Why did Mateusz blot each cylinder with a paper towel before measuring its mass at the end, and why must he blot every cylinder in the same way?

(2 marks)

4 Give **one** hazard in this practical and describe how to reduce the risk.

(2 marks)

5 Calculate the value of X in the table, the percentage change in mass in the 0.2 mol/dm^3 solution.

Give your answer to 1 decimal place. Show your working.

(3 marks)

6 Mateusz's friend said he should just compare the change in mass in grams. Explain why percentage change in mass is better.

(2 marks)

7 Identify the anomalous result in the table and suggest what Mateusz should do about it.

(2 marks)

8 The potato cylinder in distilled water (0.0 mol/dm^3) gained mass. Explain why, using ideas about osmosis.

(3 marks)

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9 Calculate the change in mass in grams of the cylinder in the 1.0 mol/dm^3 solution, and say whether it gained or lost mass.

(2 marks)

10 **Higher tier**

The percentage change in mass was +5.9% at 0.2 mol/dm^3 and -3.8% at 0.4 mol/dm^3.

Assume the percentage change falls at a steady rate between these two concentrations. Estimate the concentration of sugar solution that would give no change in mass. Give your answer to 2 significant figures. Show your working.

(3 marks)

11 **Higher tier**

What does your answer to the last question tell you about the potato cells? Explain your answer.

(2 marks)

12 Mateusz's balance reads to 0.01 g.

a. State the resolution of the balance.

b. Another group used larger cylinders, about 10 g each. Explain why this would make the percentage changes more accurate.

(3 marks)

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13 Mateusz only used one cylinder at each concentration. Describe how he could check whether his results are repeatable, and how another group could check that they are reproducible.

(2 marks)

14 Plan an investigation to find out whether sweet potato cells or ordinary potato cells have the more concentrated solution inside them.

(6 marks)

End of questions | Total 36 marks | The answers sheet has the full method as revision notes.

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