

Experimental Report: Osmosis

Aim

To investigate the effect of varying concentrations of salt water on the weight of a potato core.

Materials

- Salt powder (NaCl)
- Distilled water
- 1 × spatula
- 1 × potato
- 6 × 100ml beakers
- 1 × corer and knife
- 1 × electronic balance
- 1 × stopwatch
- 1 × ruler

Method

1. Make 80ml of the following salt solutions in 100ml beakers: 0% (control), 1%, 2%, 3%, 4%, 5%
2. Using a corer, extract potato segments (6 in total) and then cut them to uniform lengths (5 cm)
3. Individually, place the cores on the electronic balance and record the initial weight
4. Put one core in each of the beakers and leave them for 20 minutes
5. After 20 minutes, remove the cores from the different solutions and dab dry with paper towel
6. Place the cores on the electronic balance and record the final weight
7. Collate your results with the data generated from the other student groups (or dummy data)

Results

Salt Solution (%)	Weight of Potato (g)	Your Data	Group 1	Group 2	Group 3	Group 4
0	Initial					
	Final					
1	Initial					
	Final					
2	Initial					
	Final					
3	Initial					
	Final					
4	Initial					
	Final					
5	Initial					
	Final					

Initial = Weight of the potato core *before* submersion in the salt solution

Final = Weight of the potato core *after* submersion in the salt solution

Task

To write an experimental report on this activity that conforms to the grading requirements for the internal assessment. This report is not expected to be of the standard of a final IA report and will not include all sections. But the following sections *should* be included as part of your final report:

Research Question:

- Include a focused research question that includes all relevant details (timings, amounts, etc.)

Introduction:

- Summarise the relevant scientific theory and define key terms (osmosis, hypertonic, etc.)
- Provide a context for the investigation (e.g. increasing soil salinity due to climate change?)

Hypothesis:

- Predict a trend between salt concentration and percentage weight change with justification
- Suggest the isotonic point for the potato cores (concentration that results in no weight change)

Variables:

- Identify the independent and dependent variables, along with all relevant control variables
- Identify relevant uncontrolled variables and identify measures taken to reduce their impact

Materials / Method:

- Include specific quantities for all material used and identify uncertainties of measuring devices
- Method should be written as a series of numbered steps (in third person, past tense)

Results:

- Include relevant qualitative observations for each independent variable condition
- Include an appropriately formatted raw data table (IV = rows ; DV = columns)
- Remove any outliers from the raw data (outlier = >1.5 time IQR beyond 1st or 3rd quartile)
- Include an appropriately formatted processed data table (showing percentage weight change)
- Include a line graph of the processed data (with trendline, error bars and correlation coefficient)

Discussion:

- Describe trends seen in the data (shape of trendline, positive versus negative weight changes)
- Determine the isotonic point of the potato cell (interpolate point where trendline crosses X axis)
- Assess the precision of the data (comment on the error bars and whether they overlap)

Evaluation

- Identify strengths in the experimental design (e.g. repeat trials to improve reliability of the data)
- Identify weakness or limitations in the methodology (including the impact they had on the data)
- Suggest realistic improvements for each identified weakness

Conclusion

- Determine whether the data supports the hypothesis (consider if limitations affect the validity)
- Suggest area of further study (this is not a design improvement, but a new avenue of research)