General Biology Year 11

Unit 1 - Classification and cell processes

Task 5: Investigation – Osmosis in living tissue

(weighting 5%)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name:** | **Teacher: Mr Groznica** | **Date:** | **Score:**  / |

**Introduction**

The process of osmosis plays a significant role in the correct functioning of living organisms.

You might have experienced some of the following situations:

• The front door bell rings just after you have put a tea bag in a mug of boiling water. When you come back a few moments later, the tea is ready even though you haven’t ‘jiggled’ the tea bag.

• After they have been soaking in water, you find that the raisins and sultanas you are going to use in the Christmas cake have taken up a lot of water and have swollen up. These are everyday examples of important ways by which water molecules are able to move.

**Time plan**

You will have **four periods in class** to plan, carry out this investigation and write your report. This activity will be carried out by a group, however, each student will individually provide a plan, analyse the results and write their own report.

**What you need to do**

*Plan the investigation*

* Write a plan for your investigation. Include your hypothesis and identify the independent variable, the dependent variable and a number of variables that you will control. Check whether the materials that you intend to use are readily available. Set out your method, using diagrams to show what you intend to do. Indicate how you will collect measurements.
* Submit your plan for approval.
* Order your materials through your teacher.

*Conduct the investigation*

* Collect your materials and set up your investigation
* Carry out preliminary trials and modify your experiment if necessary.
* Conduct your investigation

*Process, evaluate and communicate findings*

* Collate results
* Represent data using the most suitable format
* Analyse results identifying trends
* Prepare a scientific report of your findings

**Note: Please refer to Appendix A for further information on how to plan your**

**investigation.**

**APPENDIX A**

**Purpose:**

To investigate osmosis in living cells

**Materials:**

● Fresh potato

● Six 30 mL disposable sample cups or 100 mL beakers

● Marking pen

● Dissecting board and scalpel

***C A U T I O N***

**Handle sharp objects carefully.**

● Dissecting needle

● Paper towel and tissues

● Cork borer no. 6 (6 mm) or bigger

● Centimetre ruler

● Stock solutions of distilled water and 0.5%, 1%, 2%, 5% and 10% sodium chloride (NaCl).

● Access to top-loading electronic balance accurate to two decimal places (0.01 g)

**Method:**

Table1: Change in mass of potato cylinders

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **% NACl** | | | | | |
|  | **0** | **0.5** | **1** | **2** | **5** | **10** |
| **Initial mass (g)** |  |  |  |  |  |  |
| **Final mass (g)** |  |  |  |  |  |  |
| **Change in mass (g)** |  |  |  |  |  |  |
| **% Change in mass** |  |  |  |  |  |  |

**(3 marks)**

**1.** Set out six sample cups and label them in the following way:

0% NaCl, 0.5% NaCl, 1% NaCl, 2% NaCl, 5% NaCl and 10% NaCl.

**2.** Cut a number of cores from a fresh potato using a no. 6 (or bigger) cork borer. Push the cores out of the borer using the blunt end of a pencil. Trim the ends square and cut twelve 2 cm long cylinders.

**3.** Weigh two cylinders on the top-loading balance, record their mass in Table 1 and put them in the sample cup labelled ‘0% NaC1’.

Repeat this process for each of the sample cups in order. **Record the masses in the proper places in Table 1.**

**4.** Note the time, and fill each cup to the same depth with the correct sodium chloride solution.

**5.** After at least 30 min, remove the potato cylinders from the 0% NaCl cup (use a dissecting needle or forceps to lift them out). Place them on paper towel, pat them dry with a piece of paper towel, taking care that pieces of paper do not remain on the potato, and weigh them on the top loading balance. **Record the final mass of the potato in the correct column of Table 1** **and return the cylinders to the cup.**

**6.** Repeat this process with the cylinders from each of the other cups in order. This must be done quickly so that there is not too much time difference between each one. **Complete the calculations in Table 1.**

**Note:** The change in mass may be negative in some cases.

Mass change (+ve or –ve) X 100

% change in mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Initial mass

**7.** Remove a potato cylinder from each cup in turn and observe its appearance and ‘feel’.

**8.** Dispose of your material and equipment as directed by your teacher.