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**Year 12 General Human Biology**

**Task 1: Practical – DNA extraction (5%)**

RESULT

/ 16

**Task 1**

**TYPE:** Practical

**CONTENT:** DNA extraction

**WEIGHTING:** 5%

**Student Name: ­­­­­­­­­­MARKING KEY**

**Due date: \_\_\_ / \_\_\_ / \_\_\_\_\_\_\_\_\_**

**Teacher:** Mrs. Cunningham

**CONDITIONS:**

Students will work individually to extract DNA from plant material to demonstrate their ability to follow instructions, manipulate apparatus, take accurate readings and work safely.

50 minutes allocated.

16 Marks

**TASK DETAILS:**

Work individually to demonstrate their ability to manipulate apparatus, make observations and take accurate readings to safely collect meaningful data.

You will be required to demonstrate your skills in the use of apparatus to demonstrate the:

* measure volume, mass and temperature
* observe reactions
* use laboratory equipment safely and correctly

Your ability to manipulate apparatus, take accurate readings and work safely will be assessed.

You will have completed the following practical activities in class before the assessment:

* extracting DNA from living material

DNA extraction

**NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**BACKGROUND:**

Your body is composed of many different types of cells. A microscope can be used to view these cells. It is important that your cells obtain the required nutrients and gases and remove wastes, so they are able to function efficiently. There are a number of exchange processes that allow for the exchange of materials into and out of cells.

To complete this task, you will demonstrate your skills to

* follow directions and use apparatus to extract DNA from a piece of fruit.

You will have **50 minutes** to complete the activity. You will be provided with a set of equipment to use during the task. All observations and responses to questions should be recorded on the following pages.

The teacher will:

* monitor your ability to manipulate the equipment correctly and safely.

**INSTRUCTIONS:**

* Read the information provided for each activity and record all observations and responses to questions on this sheet.
* Once you have completed the activities, make sure all the equipment is returned to the tray.

**PART 1: Safety (Total 3 marks)**

Refer to the following safety data sheets (SDS) to answer the question that follows. (3 marks)

|  |
| --- |
| **SAFETY DATA SHEET**  **Isopropanol**  **DANGER**  Pictogram of FlamePictogram of Exclamation mark |
| 1. **IDENTIFICATION** |
| Clear liquid used as a rubbing alcohol, antiseptic and cleaner |
| 1. **HAZARD STATMENTS** |
| H225 – Highly flammable liquid and vapour  H319 – Causes serious eye irritation |
| 1. **SAFE HANDLING** |
| **Maintain safe laboratory work practices. Wash hands before breaks and at the end of work.**   * Wear PPE, including safety glasses, closed shoes, lab coat and gloves * Keep away from hot surfaces and open flames * Avoid static discharge * Do not breathe in vapours * Avoid contact with eyes, skin or clothing |

1. Prepare a risk assessment for using isopropanol, by identifying one potential hazard, a risk associated with the hazard, and a suggested management strategy for the hazard.

(3 marks)

|  |  |  |
| --- | --- | --- |
| **Hazard** | **Risk** | **Management strategy** |
| **Identifies one potential hazard (1)**  **Highly flammable**  **Causes eye irritation** | **Identifies one risk associated with the selected hazard (1)** | **Suggests a management strategy for the identified risk (1)** |

**PART 2: Extracting the DNA (Total 8 marks)**

To extract the DNA from your piece of fruit carefully follow each step below. Answer the questions in the spaces provided. Check boxes have been provided next to each instruction to help you keep track of your progress.

**Step 1**: Preparing the fruit

* Peel the fruit and chop into small pieces.
* Put the fruit pieces in a plastic bag and mash.

1. Explain why you chopped the fruit into small pieces and mashed it up in Step 1. (2 marks)

**Increases the surface area (1)**

**For exposure to chemicals/salt and detergent (1)**

**Step 2:** Preparing the extraction buffer solution

* Add 5 g of liquid detergent to a 250 mL beaker.
* Add 2 g of salt to the beaker.
* Add 100 mL of tap water to the beaker.
* Stir slowly until the salt has dissolved.
* Add the buffer solution to the mashed fruit in the bag and squish to mix.

1. Explain the purpose of adding the salt to the fruit mixture in Step 2. (2 marks)

**Makes DNA less soluble in water/helps DNA precipitate (1)**

**When it comes into contact with alcohol (1)**

1. Explain the purpose of adding the detergent to the fruit mixture in Step 2. (2 marks)

**Breaks down cell membranes (1)**

**Releasing cell contents (1)**

**Step 3**: Extracting the DNA

* Filter the fruit mixture through a sieve lined with gauze into a clean 250 mL beaker.
* Add 100 mL of ice-cold ethanol slowly down the inside of the glass.
* Observe the white layer separating out and sitting at the top of the filtered fruit mixture. This is the DNA.
* Use forceps to collect the DNA.

1. Explain the purpose of adding the alcohol to the fruit mixture in Step 3. (2 marks)

**Causes (salty) DNA to precipitate (1)**

**Forming white clumps (of DNA) (1)**

**PART 3: Teacher observations (Total 5 marks)**

Whilst conducting the experiment your teacher will be observing you using the equipment correctly.

(5 marks)

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| Correct use of balance to weigh the salt | **(1)** |  |
| Correct use of balance to weigh the detergent | **(1)** |  |
| Selected appropriate container for measuring volume of water and alcohol | **(1)** |  |
| Measured the volume of liquids accurately | **(1)** |  |
| Uses equipment safely | **(1)** |  |

**END OF ASSESSMENT**