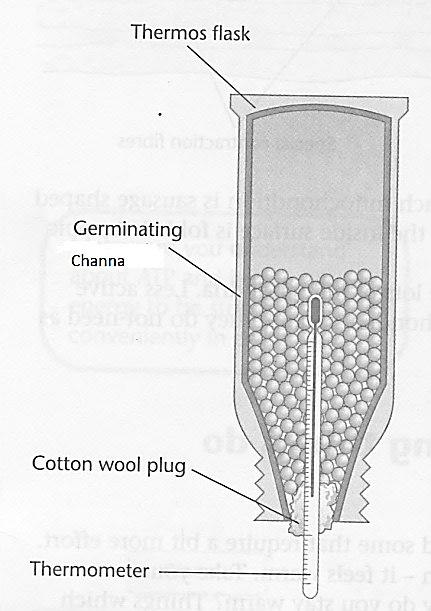
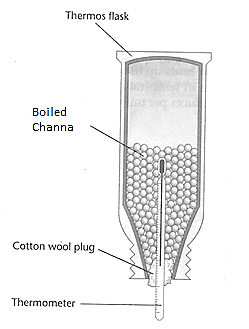
**INVESTIGATING AEROBIC RESPIRATION IN CHANNA**

**AIM:** To determine if heat is produced from channa undergoing aerobic respiration. **Skill: AI**

**APPARATUS and MATERIALS:**

* Thermos flasks
* Thermometers
* Retort stands
* Clamps
* 50g of germinating channa
* 50g of dead channa
* Bleach and disinfect
* Cotton wool
* Tape
* Electronic balance
* labels

**DIAGRAM:**

FLASK A – GERMINATING CHANNA FLASK B – BOILED CHANNA

DIAGRAM SHOWING THE SET UP OF APPARATUS TO INVESTIGATE AEROBIC RESPIRATION OF CHANNA.

**METHOD:**

1. Label 2 flasks A and B.
2. Weigh 50g each of germinating and boiled channa.
3. Place the germinating channa in a Flask A and the boiled channa in Flask B.
4. Secure the neck of the flask using cotton and tape with a thermometer inserted halfway in the flask.
5. Invert the flasks and attach to the retort stand in a cool and shaded place.
6. Record the temperature of each flask after five (5) minutes then again once every four (4) days.

*Rewrite your method into past tense in the space below or on a separate page.*

**METHOD**:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**RESULTS:** (*Add a title to the table and collect your measurements, then plot a graph.)*

**Table** showing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **Time (days)** | **Temperature of Flask A –**  **Germinating channa (°C)** | **Temperature of Flask B –**  **Boiled channa (°C)** |
| 0 |  |  |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

**Graph** - Plot on a separate graph page or below.

Remember to put a TITLE and scale, label the axes with units of time (days) or temperature (°C).

**DISCUSSION:** (On a new page, using full sentences in paragraphs)

1. Define aerobic respiration.
2. Explain the importance of respiration in the body.
3. Write the word and chemical equations for aerobic respiration (on separate lines each).
4. List the conditions needed for germination. (Hint: water, oxygen and food in the seeds; sometimes darkness)
5. Explain the function of the following in the experiment:- flask, cotton, and thermometer.
6. Account for the changes in temperature (using the values in your result) in flask A and describe the shape of the curve on the graph.
7. Account for the changes in temperature (using the values in your result) in flask B and describe the shape of the curve on the graph.
8. Identify some sources of error or limitations as outlined below:
   1. Thermometer may not have been secured properly in the cotton so the bulb may have not been in the centre of the channa to measure the correct temperature.
   2. Readings of the thermometer may not have been at eye level.
   3. Temperature reading collected at different times of the day may lead to unreliable data.
   4. The masses of the channa were not correctly measured.

**CONCLUSION:** (Relate to your aim and findings/results.)

What did you find out in this lab about germinating channa undergoing respiration as opposed to dead channa?

**MARKSCHEME – OBSERVING, RECORDING AND REPORTING SKILLS (ORR)**

|  |  |  |
| --- | --- | --- |
| **ORR CRITERIA** | | **Mks** |
| **Observations** | * Significant changes noted * Original and final conditions compared * Control noted OR diagram | **3** |
| **Recording**  Tables/ Graph | * Title – above, in capitals - 1 * Column & row headings (with units) - 1 * Enclosed and neat -1   OR   * Title – at base, in capitals, underlined -1 * Both axes labelled with units - 1 * Accurate plots – 1 | **3** |
| **Reporting** | * Format - **ALL** sections present – 1 * Aim in capital letters - 1 * Acceptable language and expression –   grammar – 1 and spelling – 1 | **4** |
| **TOTAL** | | **10** |

**MARKSCHEME - ANALYSIS AND INTERPRETATION (AI)**

|  |  |
| --- | --- |
| **Criteria (AI)** | **Marks** |
| 1. Define aerobic respiration | 1 |
| 1. Correct word and chemical equations | 2 |
| 1. Functions of flask, cotton and thermometer | 3 |
| 1. Explain results for Flask A vs Flask B | 2 |
| 1. Identifying sources of error and limitations | 2 |
| **TOTAL** | **10** |