The National Orthodox School Shmaisani

IB Foundation Years (9 & 10) Lab Report

1) Writing a fully focused research question

- Must include the range of the independent variable with units
- Must include the dependent variable
- Method of measuring the dependent variable

what is the effect of (IV) the tempreture what range will you be uisng 25°(room temperature,37° and 70° on the -----DV—rate of oxygen produced--measured by a graduated cylender (ml) (write the method and the units) in 2 minutes?

Commented [M1]: Volume of gas

2) Scientific background

- Research your independent variable
- Research its effect on your dependent variable
- Research the method of measuring the dependent variable
- Include citation

1. **The independent valuables in this experiment is the temperature. Temperature is the average kinetic energy in a system.**
2. **The dependent variable is the rate at which the oxygen is produced. The more hydrogen peroxide produced means the rate of reaction is increasing.**
3. **By using a graduated cylinder**

3) Hypothesis:

Outline a hypothesis to predict the outcome of the experiment and explain it using logical scientific *reasoning (what do you think is going to happen*

If the temperature increases then the amount of oxygen produced will increase as well until a specific point.

(State the IV) (increase, decrease, or change)

Citations/References:

(State the DV) (increase, decrease, stay the same, or change)

Scientific explanation for hypothesis (This is the explanation to the previous hypothesis. Why do you think that your hypothesis is correct? Explain it in detail with reasons and causes. You may also find research at this point if allowed).

Because: enzymes in lower temperatures will have the lowest rate and as the temperature increases the rate of catalase enzyme will increase as well because the particles will gain more kinetic energy which will make them move faster and collide more. Leading to them reaching the maximum activation energy quicker making them react more often. This will continue to happen until a specific point, which is the point where it reaches its optimum temperature. When it exceeds its optimum temperature the ezyme will stop working because the shape of the active site will change meaning that the substrate won't fit in it. therefore, the enzyme will become in active and become denatured.

4) Manipulating the variables:

What is your independent variable?

- What are the units?
- How will it be changed stating the instruments that you will be using
- Will you be doing a control experiment?
- Why did you choose this range?

The temperature (°C) will be changed using a water bath with temperatures of (25, 37 and 70)°C while having everything else constant.

Discuss your dependent variable [the method of measurements + units+ time frame]

When oxygen increases the volume of water decreases so when the enzyme catalase comes into contact with its substrate, hydrogen peroxide, it starts breaking it down into water and oxygen. Oxygen is a gas and therefore wants to escape the liquid.

Controlled Variable	How will you keep this controlled? Stating the values and the equipment that you will be using	How could it affect your results if not controlled?
The time taken	Using a stop watch	It wont be a fair test because the enzyme could break more of the substrate than it should've done making the test unreliable
The amount of hydrogen peroxide	Using a graduated cylinder(ml)	It won't be a fair test because it would take more energy A slight increase in the concentration of water leads to loss of enzyme activity.

Table 1: shows the controlled variables of the experiment

Commented [M2]: Add more controlled variables

5) Materials and Method:

State your materials [number needed + units] (Be descriptive, example: 10cm^3 graduated cylinder) include the uncertainties for each piece of apparatus

Conical flask, 100 cm3, 2

Measuring cylinder, 100 cm3, 1

Measuring cylinder, 50 cm3, 1

Clamp stand, boss and clamp, 2

Stop clock/ stopwatch

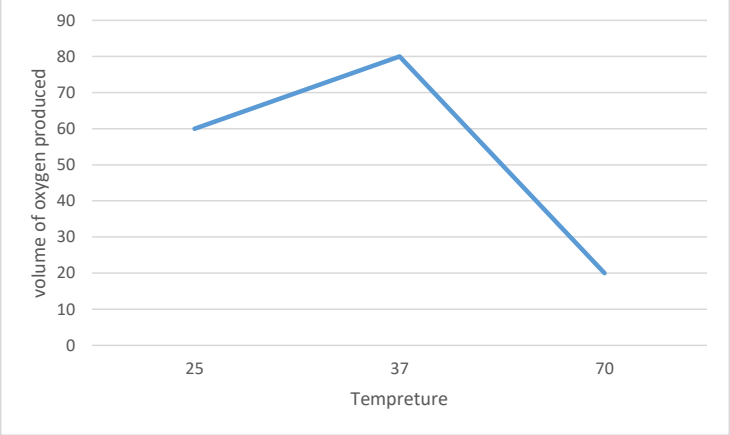
tube

Method : What are the steps of the investigation?

- State step by step your method [must be clear and easy to follow]
- **Draw and annotate a diagram or add an annotated photo in the space (** This annotated (labeled) diagram of your equipment set up.
- State the number of trials per increment of the independent variable

1. Place 10ml (4%) hydrogen peroxide solution in a conical flask.
2. Add 0.2g of yeast
3. Add 15ml spoon full of sugar
4. Place the tube on the top of the conical flask
5. Fill in a bowl with water with a temperature of 25°
6. Fill in the 50ml conical flask with water and submerge it under the bowl filled with water
7. Record the amount of oxygen produced in 2mins
8. Use the stop watch to time the 2 minutes
9. Put you results in a table
10. Repeat the experiment using (25, 37, 70)°C

*note that u should rinse the conical flask after every experiment



6) Safety, Ethical and Environmental issues

Handle hydrogen peroxide with care because it may burn your skin and use gloves.
Hydrogen peroxide is harmful and must be removed as soon as it is produced in the cell.
Wear eye protection and cover clothing when handling hydrogen peroxide.
Wash splashes of pureed potato or peroxide off the skin immediately.
Be aware of pressure building up if reaction vessels become blocked.
Take care inserting the bung in the conical flask – it needs to be a tight fit, so push and twist the bung in with care.

7) Results

Add a table for qualitative results e.g. Variation within the organism/biological material being are dealt with; Color, texture, shape, size, heat changes; Anything you notice that might affect results.

Trails	Qualitative data
25°	Water decreased a little bit
37°	water decreased more than 70° but less than 25°
70°	Water decreased the most

Table 2: shows the physical changes during the reaction

Raw Data

- Construct a table to add your raw data , add a fully detailed title to your table .
- Label your table (table 1, table 2…)
- Add suitable headings with units and uncertainties to your table.
- Unify your decimal points

final	Initial	avarage
60	25	62
80	37	79
20	70	617

Table3: shows the result after each experiment

Commented [M3]: Final and initial what ?

Processed data q

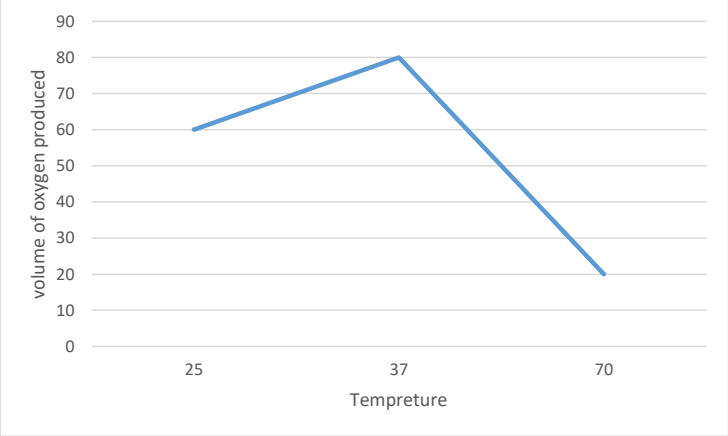
- Justify the reason for data processing
- Add screenshots from excel to provide evidence for your work, or provide a sample calculation

- Construct a table to add your results

- Add a title for your table and label it
- Unify your decimal points

temperature	Volume
25	60
37	80
70	620

Commented [M4]: Draw a table



Conclusion: the hypothesis was correct the rate increased until the optimum temperature which was 37^{o} as shown in the graph after that the enzyme got denatured therefore the rate decreased as shown in the graph at temperature 70^{o}.