



IB Foundation Years (9 & 10) Lab Report

Research question:

What is the effect of temperature (25,37,70 celsius) on the rate of the reaction catalyzed by enzyme (enzyme activity) measured by volume of gas connected in the tube (cm³) on 3 trials for each temperature, this will be done by measuring the volume of gas produced using a measuring tube

2) Scientific background

As the temperature increases so does the rate of enzyme activity. An optimum activity is reached at the enzyme's optimum temperature. A continued increase in temperature results in a sharp decrease in activity as the enzyme's active site changes shape. As with many chemical reactions, the rate of an enzyme-catalyzed reaction increases as the temperature increases. However, at high temperatures the rate decreases again because the enzyme reaches its optimum temperature and becomes denatured and can no longer function.

The method of measuring the dependent variable (volume) while changing the independent variable (temperature) is counting the bubbles produced (gas) in one minute

3) Hypothesis:

As the temperature increases then the volume of gas produced increases until a certain point hence when the enzyme reaches its optimum temperature, enzyme denatures, and the volume of gas will start decreasing

Enzyme yeast sugar

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:

As the temperature increases, the kinetic energy of the gas molecules increases, and their velocity also increases. Also, their intermolecular forces weaken, resulting in the expansion of spaces between the molecules, which in turn leads to an increase in the volume, it increases until it reaches the optimum then it decreases

Citations/References:

4) Manipulating the variables:

Degree Celsius/cm³

The temp 37c is the control

We chose 25-70 because 70 is the optimum of the reactivity of the catalase and 25 because it was the room Temperature
the enzyme activity changes with the variables

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?
Temperature of water	We will control the temperature of water using a water bath	We wont be able to record an precise result, as we wont have a specific temperature
Amount of catalyst used	Measuring the exact same amount of catalys for all trials	It will affect the results (un accurate)
Type of catalase	Using the same type of the catalase for all trials	It will affect the results (un accurate)

Commented [M1]: Write more details

5) Materials and Method:

State your materials (number added& units) be descriptive, ex: 10 cm³ graduated cylinder.
Include the uncertainties for each piece of apparatus.

Method: What are the steps of the investigation?

- 1- measure 0.1g of yeast powder
- 2- measure 5cm of hydrogen peroxide for 3 samples
- 3-label each tube for (25c,70c,37c)
- 4- put them in a water bath for different temperatures
- 5- set up inverted measuring cylinder
- 6-connect them with a tube into the underwater cylinder
- 7-after one minute count the number of bubbles and divide it by the time taken
- 8-repeat the experiment for accuracy

Measurements:

- 1 plate
 - 1 conical flask ()
 - 1 water bath (25c,70c,37c)
 - 1 rubber tube
- These are the materials for only 1 trial

6) Safety, Ethical and Environmental issues

Safety:

- 1) Handling hydrogen peroxide carefully by using gloves
- 2) care taken with glass so it doesn't get broken

environmental:

- 1) disposing hydrogen peroxide carefully down the sink without splashing

Commented [M2]: Qualitative data is missing

7) Results

Raw Data

Temperature (c)	Trial 1 (volume of gas collected)	Trial 2 (volume of gas collected)	Trial 3 (volume of gas collected)
25	20	21	20
37	63	61	65
70	5	3	0

Processed data:

Temperature	Trial 1(ml)	Trial 2 (ml)	Trial 3(ml)
25	0.3	0.35	0.33cxx
37	1.05	1.01	1.08
70	0.08	0.05	0