

An Investigation into the Effect of Temperature on the Rate of Respiration in Yeast.

Aim: My aim is to try to find out the different variety of temperatures affecting the rate of respiration in my coursework.

Introduction

My coursework is about the rate of the yeast respiration system, yeast is a living organism also known as fungus, which use enzymes and will increase the activity if the temperature was risen by. The enzymes will start to denature at 50°C or higher and it will be useless. It has been written and scientists have proved beyond result that enzymes work best at 37°; this is also the human body temperature.

Aerobic respiration is the release of energy from glucose or another organic substrate in the presence of Oxygen. Strictly speaking aerobic means in the air, but it is the Oxygen in the air, which is necessary for aerobic respiration. Also aerobic respiration releases much more energy from a given amount of food. The equation for the aerobic respiration



Aerobic respiration is when we measure we measure the rate of respiration by measuring the carbon dioxide given out. This process takes place in the presence of oxygen.

Prediction

I predict that when the temperature rises we will produce more carbon dioxide. I have to remember this will only happen till a certain point until the enzymes start to denature this is my prediction.

Hypothesis**Preliminary Results**

Temperature	No of bubbles after 2 minutes	No of bubbles after a minute
20	0	0
30	25	12.5
40	30	15
50	40	20
60	19	9.5

My preliminary results have proved that after 50°C that the amount of carbon dioxide that was produced was cut down.

This shows that enzymes in the yeast work in a particular way, the enzymes seem to slowly work in the 'Lock & Key' mechanism technique and it was used where enzymes fit in to substrate molecules. If the glucose and yeast both were heated a bit too much then they will vibrate and fall apart and then there will be not much carbon dioxide left to be produced.

Apparatus

Below are the apparatus I have been using throughout the experiment of the yeast experiment.

The experiments I have used are: Conical flask, yeast, thermometer, test tube, clock, water, water bath, 10cm³ measuring cylinder, glucose and rubber tubing.

Yeast	Conical flask
Rubber tubing	Clock
Thermometer	Water
10cm ³ measuring cylinder	Water bath
Test tube	Glucose

Method/Diagram

1. Below is how the equipment was set when I set it up for the experiment of the yeast respiration experiment: -

2. Firstly you will have to measure the right amount of yeast solution in the measuring cylinder and for this one it will be 20cm^3 , you then will have to pour the yeast solution in to the conical flask provided.
3. On the conical flask place on the rubber bung that is shown on the diagram showing how the experiment was set-up.
4. You then take the end of the tube from the bung in the conical flask in to the boiling test tube where the tube will contain water.
5. You now take the conical flask and the boiling test tube to a water tank, this will slowly enable the solution in the conical flask to warm up and then after to produce gas bubbles. (You only put the conical flask in to the tank which is set at 20°C) You now take the conical flask and place in a water tank of 20°C , this will enable the water to warm and will start producing gas bubbles.
6. As soon as you have placed in the conical flask in to the tank start counting the gas bubbles in the first minute of the procedure then note down how many bubbles you have counted and then carry on until the full two minutes have finished and then you note those down also.
7. Once you have completed the experiment of yeast respiration, repeat the whole of the experiment again and again but each time you do the experiment you place the conical flask in a water tank in a temperature of higher than 20° , with the higher temperature the yeast solution will produce more gas bubble, you will see this in the boiling test tube. This will help give more evidence to my results and will help me in my work.

The Fair Test

To have accurate results and also to improve the results I will complete the same experiment three times each of each temperature, after I have done this I will take an average out of the three results produced and then I will measure the factors, these are yeast and glucose. I hope to keep my results accurate and safe and hopefully I wish not to produce any anomalies in my graph I will draw for my results table.

Safety Measures

There are a few hazards in the experiment which will take place some of them are listed below:

Yeast is alive and is a living fungus, with this along with glucose mixed I must take a great deal of care as the fungus might spread quickly, I must wash my hands every time not just when it is the next experiment. Washing hands can stop spreading germs and can stop someone having some kind of accident. There is also another hazard, which are the conical flask and the boiling test tube, these are dangerous as these are made of glass. Rushing the experiment might include running across the floor, which, may be wet, and you could also drop the flask or the test tube and it might crack and fall. I must take a precaution during this experiment of the yeast respiration.

Analysis

While I was counting the bubbles in the experiment I was also writing the results down when I noticed that the respiration increased while the temperature increased when suddenly after about 50°C the amount of carbon dioxide there was had a sudden drop instantly. Till about 50°C the carbon dioxide went down. This was a pattern I noticed which the rate of respiration increased and then there was an instant decrease, I saw that every 10°C of carbon dioxide will double but I never noticed this in my results, this I thought would make my results wrong, but I was told my results were positive and were very accurate. My hypothesis and prediction can be backed by the fact that I have done the experiment and my graphs it shows exactly what I said taking into account of an anomaly. All this is backed up again by looking at another group's results and seeing that it says the same thing that after 50°C the enzymes had started to denature and become useless.

Evaluation

In the duration of my work I think I have sufficient evidence including my results to make a valid conclusion. I followed all instruction told and written by my instructor and I had taken all the precaution, which are very important. Once I did what my instructor asked me to I received valid results and valid information to work along with me. I worked on the experiment with my partner, we both had the same results and prediction and followed instruction as we were told them. Although the results were not to my standards they were valid but not as accurate I hoped them to be. To improve on the next time I might repeat the experiment I should measure the amount of carbon dioxide produced not by counting the bubbles. I think this may have been more accurate than counting bubble as we could actually measure the carbon dioxide and not measure the bubble.

In my work I was able to receive valid results and it is sufficient enough to make a valid conclusion. I averaged out my results, my partner decided to complete the experiment four times than we had originally decided which was three per temperature. All the apparatus was wash and ready to use before each experiment took place. While I was drwing out the graph and working I found one anomalie which I though was my fault as I had not read the measuring cylinder properly as I poured the solution (Yeast & Glucose) in it will make a difference in my work.

To improve my work next time I will read the right amount of solution of yeast and glucose, I will try different temperatures in the conical flask to warm up in to obtain improved results.