

Respiration of yeast

Fermentation is the incomplete breakdown of glucose in plants, resulting in the formation of alcohol and carbon dioxide, and the release of a little energy. Also fermentation is an anaerobic reaction, which means without oxygen.

Planning

For my biology courses work I investigated the amount of carbon dioxide produced when yeast is combined with a sugar solution. This reaction is called fermentation. The reaction follows this equation:



The following are factors that will affect the rate of fermentation:

- Concentration of sugar solution,
- Type of sugar,
- Temperature of the environment ,
- Age of the yeast,
- The weight and amount of the yeast,
- Temperature of water surrounding the reactions

The factor chosen to be varied is the concentration of sugar within the solution. So the other factors are to be kept as control factors to make this experiment fair. The following are the controlled factors:

- The sugar used was glucose because it is easy to decompose,
- The weight of the yeast was to be kept at 1.5g,
- The temperature of the environment was 40°C so that the enzymes do not denature,
- The yeast must come from the same source, so it is the same age because this may effect the rate of reaction.

Prediction:

I predict that the higher the temperature of the water surrounding the reaction and a higher percentage of sugar solution will produce more carbon dioxide (bubbles). This is because heat will make the yeast atoms vibrate and split up causing yeast enzymes to combine and react producing carbon dioxide (CO₂).

Method:

- We collected and set up the apparatus as shown on the diagram,
- Weighed the yeast to 1.5g,
- Filled and boil the kettle,
- Emptied the kettle content into the beaker,
- Added cold water to make the temperature 40⁰c by using a thermometer,
- Poured 20ml³ of 0% sugar solution into a test tube,
- Put the 1.5g of yeast into the sugar solution,
- Started the stopwatch,
- Made sure the bung and delivery tube was securely on top of the test tube with the reaction in it so that carbon dioxide doesn't escape,
- Place a test tube filled half way with water at the other end of the delivery tube so that the carbon dioxide is visible via bubbles,
- Wait for three minutes so that the sugar solution and yeast reaction goes to the same temperature as the surrounding water,
- When the three minutes are up we started counting the bubbles for another three minutes. Then when the six minutes are up we stopped the clock and measured the finishing temperature of the surrounding water and noted the results,
- We repeated the experiment three times to make sure it is accurate.

Apparatus:

Spatula, test tube rack, delivery tube, measuring cylinder, test tube, stopwatch, kettle, beaker, thermometer, sugar solution, yeast and scales.

Conclusion:

Looking at my results I have come to the conclusion that the higher the percentage of sugar solution the more carbon dioxide is produced in the amount of time given. The relationship between my prediction and the results are similar.

Evaluation:

I think my method explains what I did in my experiment and is simple to follow and easy to understand. Looking at my result table I can see some anomalous results this might be because of carelessness or improper use of equipment this is why the experiment was repeated three times. If I were to do the experiment again I would make sure I had more time to ensure the results are more accurate. For example I would make sure the yeast used are at the same weight and assure that the starting temperature of the water surrounding the reaction is remains at 40⁰c.