A-level Biology example for required practical 1

Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction: The effect of temperature on the rate of the reaction catalysed by trypsin

Student sheet

Casein is a protein found in milk. Trypsin is an enzyme that digests casein. When trypsin is added to a dilute solution of milk powder, the casein is digested and the solution goes clear.

Method

You are provided with the following:

- 0.5% trypsin solution
- 3% solution of milk powder
- pH 7 buffer solution
- a large beaker to use as a water bath
- test tubes
- bungs or cork for test tubes
- test-tube rack
- stopwatch
- marker pen
- pipettes or syringes
- thermometer.

You are required to find the rate of reaction at **five** different temperatures. Your teacher will tell you whether you are going to investigate all the temperatures yourself or whether you will get some results from other students in your class.

You should read these instructions carefully before you start work.

1. Using a marker pen write an 'X' on the glass halfway down one side of each of three test tubes.
2. Add 10cm^3 of the solution of milk powder to each of these three test tubes.
3. Add 2cm^3 of trypsin solution to 2cm^3 of pH 7 buffer in another set of three test tubes.
4. Stand the three test tubes containing the solution of milk powder and the three test tubes containing trypsin and buffer in a water bath at 20°C.
5. Leave all six tubes in the water bath for 10 minutes.
6. Add the trypsin and buffer solution from one test tube to the solution of milk powder in another test tube.
7. Put a bung or cork in the test tube and invert about 5 times to mix thoroughly.
8. Put the test tube back into the water bath.
9. Repeat steps 6 and 7 using the other test tubes you set up.
10. Time how long it takes for the milk to go clear. Do this by measuring the time taken to first see the 'X' through the solution.
11. Record the time for each of the three experiments.
12. Using the same method, find out how long it takes the trypsin to digest the protein in the solution of milk powder at 30°C, 40°C, 50°C, 60°C.
13. Record your data in a suitable table.
14. Process your data and draw a graph of your processed data.