Bio CP2 pH and enzyme activity

Amylase is an enzyme made in the salivary glands in your mouth and in the pancreas. It catalyses the breakdown of starch into smaller sugar molecules. The iodine test identifies the presence of starch, but does not react with sugar. You will use this test to show how effective amylase is in digesting starch at different pHs.

Your teacher may watch to see if you can:

- work safely
- collect accurate data.

Aim

To investigate the effect of pH on the rate of digestion of starch by amylase.

Prediction

1 Predict which at which pH the amylase will digest starch fastest. Explain your prediction.

Method

Apparatus

- iodine solution in dropping bottle
- dimple tile
- test tubes
- test-tube rack
- syringes
- pipette
- amylase solution
- starch solution
- solutions of specific pH
- stop clock

⚠ Safety

Eye protection should be worn.

A Drop one drop of iodine solution into each depression of the dimple tile.

B Measure 2 cm^3 of amylase solution into a test tube using a syringe.

C Add 1 cm^3 of your pH solution to the test tube using a second syringe. Record the pH of the solution that you are using.

D Using a third syringe, add 2 cm^3 starch solution to the mixture and start the stop clock. Use the pipette to stir the mixture.

E After 20 seconds, take a small amount of the mixture in the pipette and place one drop of it on the first iodine drop on the tile. Return the rest of the solution in the pipette to the test tube.

F If the iodine solution turns black, then there is still starch in the mixture and you should repeat step E (after 10 seconds). If it remains yellow, then all the starch is digested and you should record the time taken for this to happen.

G If there is time, repeat the experiment using a solution with a different pH.

Recording your results

2 Collect data from all the groups in the class so that you have results for each of the different pHs. If you have more than one result for each pH, calculate a mean time for each one.

3 Draw a table to present these results clearly.

Considering your results

4 Plot a line graph to show the time taken for amylase to digest starch with the different pHs.

5 Use your graph to describe the effect of pH on the time taken for amylase to digest starch.

6 Suggest a reason for the shape of your graph.

Evaluation

7 Describe any problems you had with carrying out the experiment.

8 Suggest reasons for the problems and how the method could be changed to help reduce the problems.

9 Were any of the results surprising? If so, why?

10 Do you think you have enough results to support your conclusion? Explain your answer.