GCSE Biology required practical activity: Enzymes

Investigating the effect of pH on the enzyme amylase

Risk assessment

- Safety goggles should be worn throughout.
- Take care with boiling water.

Method

You are provided with the following:

- test tubes
- a test tube rack
- water bath (electrical or bunsen burner and beakers)
- spotting tiles
- 5cm^3 measuring cylinder
- syringes
- a stop clock
- starch solution
- amylase solution
- buffered solutions covering a range of pH, each with a labelled syringe/plastic pipette
- iodine solution
- syringes.

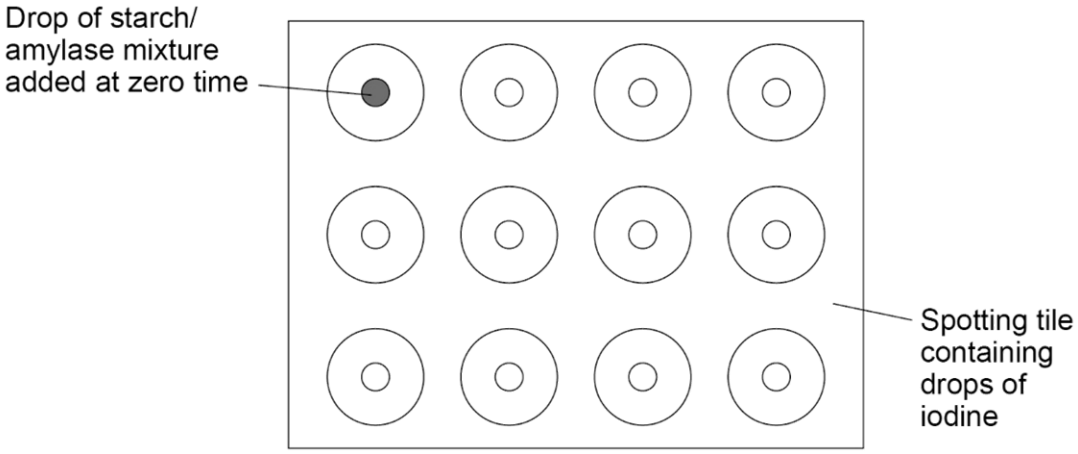
Read these instructions carefully before you start work.

1. Place one drop of iodine solution into each depression on the spotting tile.
2. Place labelled test tubes containing the buffered pH solutions, amylase solution and starch solutions in the water bath.
3. Allow the solutions to reach 30 °C.
4. Add 2cm^3 of one of the buffered solutions to a test tube.
5. Use the syringe to place 2 cm^3 of amylase into the buffered pH solution.
6. Use another syringe to add 2 cm^3 of starch to the amylase/buffer solution.
7. Immediately start the stop clock and leave it on throughout the test.
8. Mix using a glass rod.

9. After 10 seconds, remove one drop of the mixture with a glass rod.

   Place this drop on the first depression of the spotting tile with the iodine solution.

   The iodine solution should turn blue-black.



10. Use the glass rod to remove one drop of the mixture every 10 seconds. Put each drop onto the iodine solution in the **next** depression on the spotting tile.

    Rinse the glass rod with water after each drop.

    Continue until the iodine solution and the amylase/ buffer/ starch mixture remain orange.

11. Repeat the procedure with solutions of other pHs
12. Record your results in a table such as the one here.

pH of solution	**Time taken for amylase to completely break down the starch in seconds (s)**

13. Plot a graph with:
    - 'Time taken to break down starch (s)' on the y-axis
    - 'pH of solution' on the x-axis.

    or

14. Calculate the rate of reaction and plot a graph with:
    - 'Rate of reaction' on the y-axis
    - 'pH of the solution' on the x-axis.