

HUMAN BIOLOGY
Investigative Skills Assessment

HBI3T/Q09/TN

Teachers' Notes

CONFIDENTIAL

The effect of temperature on the rate of the reaction catalysed by amylase

Candidates are required to find out how temperature affects the rate of digestion of starch by amylase.

Materials

In addition to access to general laboratory equipment, each candidate needs

- 50 cm³ of 1% amylase solution
- 50 cm³ of 1% starch solution
- at least 10 cm³ of laboratory iodine solution (iodine in potassium iodide solution)
- at least 20 cm³ of pH 7 buffer solution
- water baths or large beakers that could be used as water baths
- thermometer (0 °C to 100 °C)
- spotting tiles
- 18 test tubes
- test tube rack
- timer
- marker pen or Chinagraph pencil or labels
- 4 graduated pipettes or syringes (capable of measuring up to 5 cm³)
- 6 Pasteur / dropping pipettes.

Managing the Investigation

Data from five different temperatures are required to plot the graph. In this investigation, candidates must individually collect data from at least three temperatures. Every candidate must measure the time for the reaction to complete at room temperature, 60 °C and one other temperature between these two values. Data for the other temperatures will be supplied by the teacher at Stage 2. This data can be compiled using the data from other candidates.

Data for the other two temperatures should be provided as raw data before Stage 2 is carried out. Teachers should tell candidates which additional temperature to investigate so that this is possible.

In this investigation, teachers must not give candidates the following information

- how to make sure the water baths are as reliable as possible
- whether to use a water bath at room temperature
- the colour of the solution in the well when all the starch has been digested.

One week before sitting Stage 1 of the ISA teachers may give their candidates the following information.

You will be doing an enzyme investigation on the effect of temperature on the rate of reaction.

There should be no further discussion of this topic.

Technical support

Any type of amylase, including diastase, is suitable for this investigation. As amylase is very variable all solutions should be made up from the same batch.

To make up the starch suspension, boiling water needs to be added to a smooth paste of the starch and cold water.

Although the starch is in suspension this will be described as a solution in all references.

If you use different apparatus, please change the Task Sheet to reflect the equipment available.