

GCSE Biology A (Gateway)

J247/03 B1-B3 and B7 Higher (Higher Tier)

Question Set 8

1

Students investigate how to extract DNA from peas.

Stage 1:

- Chill 10 cm³ of ethanol. Keep it on ice throughout the method for use in stage 2.
- Make a thick 'soup' by blending 100 cm³ of peas with salt and cold water. Blend for 15 seconds in an electric blender.
- Strain the 'soup' through a mesh strainer and collect the liquid part in a beaker.
- Add 30 cm³ of washing-up liquid and swirl to mix.
- Let the mixture settle for 5–10 minutes in a water bath at 60 °C.

- (a) One group of students made a water bath using a beaker of water, thermometer and Bunsenburner. Another group used an electric water bath.

Write down **two** advantages of using an electric water bath.

[2]

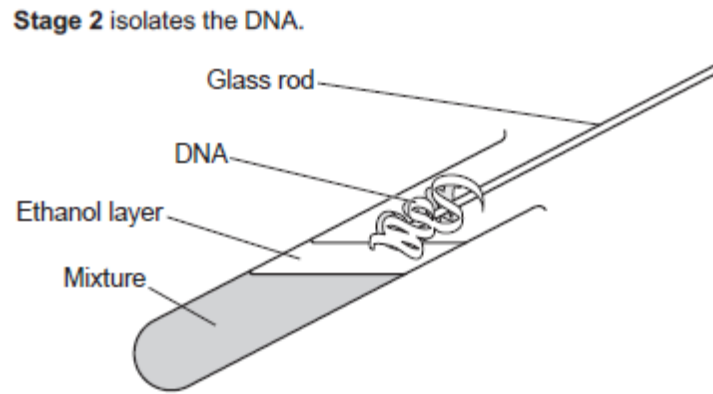
- (b) Low temperatures protect DNA by slowing down the activity of enzymes that destroy DNA. High temperatures break down membranes in the cell.

To extract DNA, some methods use a water bath at 60 °C but other methods do not use an increased temperature.

Suggest **two** reasons for the different methods.

[2]

(c) **Stage 2** isolates the DNA.



- Pour the mixture collected from stage 1 into a test tube until a third full. Add proteaseenzymes to the test tube.
- Slowly pour cold ethanol at an angle of 45° into the tube. Ethanol will float on top.
- DNA is soluble in water, but salted DNA does not dissolve in ethanol and will form whiteclumps where the water and ethanol layers meet.
- Twirl a glass rod and the DNA will collect on the rod.
- Dry the sample on a pre-weighed filter paper and measure the mass of product.

Suggest **two** safety precautions which should be taken at stage 2.

Explain why each safety precaution is needed.

[2]

- (d) Look at the table. It shows the results from the two groups of students in the investigation.

| Type of water bath used | Mass of DNA collected (mg) | | | |
|-----------------------------------|----------------------------|--------|--------|-------|
| | Test 1 | Test 2 | Test 3 | Mean |
| Beaker of water and Bunsen burner | | | | 22.9 |
| Electric | 33.6 | 32.3 | 33.3 | |

- (i) Calculate the mean mass collected in the investigation using the electric water bath.

Give your answer to 1 decimal place.

[2]

- (ii) The range of the three test readings for the beaker of water and Bunsen burner was 3.4.

Does the evidence support using an electric water bath instead of a beaker of water and Bunsen burner?

Explain your answer.

[2]

Total Marks for Question Set 8: 10

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