

READ THESE INSTRUCTIONS FIRST

These instructions give details of the apparatus required by each candidate for each experiment in this paper. A summary of the questions that will be presented to the candidates is included, where appropriate, to allow the biology teacher to test the apparatus appropriately. Testing must be done out of sight of all candidates.

No access to the question paper is permitted in advance of the examination.

Centres are reminded that candidates are expected to follow the instructions on the question paper and record all their results. They will not be penalised if these results are not what they expect.

The Supervisor should make sure that the Supervisor's Report is fully completed and a copy is enclosed with each packet of scripts.

It is assumed that the ordinary apparatus of a science laboratory will be available, including a supply of purified water (distilled or deionised).

If arrangements are made for different sessions for different groups of candidates, care must be taken to ensure that the different groups of candidates are effectively isolated so that **no information passes between them**.

All specimens should carry only the code letters and numbers as indicated and their identity should not be revealed to the candidates.

Supervisors should ensure that all specimens have the correct identity attached to the specimen and that these are **not** removed during the examination.

If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Supervisor's Report.

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used where necessary.

In accordance with COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

The following codes are used where relevant:

C = corrosive substance

F = highly flammable substance

H = harmful or irritating substance

O = oxidising substance

N = harmful to the environment

T = toxic substance

Centres are reminded that they are **not** permitted to open the question paper envelopes before the examination.

If there are any difficulties with any aspect of setting up this practical examination that the Centre is not able to resolve, it is essential for Centres to contact the Product Manager as soon as possible by **e-mail** to info@cie.org.uk, by **fax** to +44 1223 553558 or by **phone** to +44 1223 553554.

Question 1

Each candidate should be provided with:

- (i) 25 cm³ fresh full fat (whole) animal milk in a container, labelled **milk**

Milk can be from any source (cows/goats/sheep, whichever is available), but it must be fresh. The milk should be at room temperature when presented to candidates.

- (ii) 10 cm³ of 1% rennin (enzyme) solution in a small container, labelled **enzyme**

The enzyme solution should be presented to candidates at room temperature and can be made using rennet essence, vege-rennin or rennin.

This enzyme can be purchased from food stores, science providers or dairy industry providers. It needs to be kept cool, for example in a refrigerator (but not frozen) prior to use.

A 1% solution is made by adding 1 cm³ of the rennin source (or 1 g if source is solid) to 90 cm³ of distilled water and then making this up to 100 cm³ with distilled water. This is enough for 10 candidates.

The enzyme solution should be kept in a covered container in the refrigerator and removed from the refrigerator an hour before the examination to allow it to warm to room temperature.

- (iii) Four large test-tubes, standing in a large transparent container, e.g. beaker or test-tube rack
- (iv) Benedict's solution, in the usual dispensing bottle (with dropping pipette), as used for food testing, labelled **Benedict's solution**
- (v) Biuret reagent, in the usual dispensing bottle (with dropping pipette), as used for food testing, labelled **Biuret reagent**
- (vi) Iodine in potassium iodide solution, in the usual dispensing bottle (with dropping pipette), as used for food testing, labelled **Iodine solution**
- (vii) one large beaker containing water at 40 °C. Candidates have been asked to raise their hand when they need more water at 40 °C.
- (viii) means of labelling test-tubes
- (ix) means of measuring 5 cm³, e.g. 5 cm³ syringe
- (x) means of measuring 1 cm³, e.g. 1 cm³ syringe
- (xi) one beaker containing distilled water, labelled **for rinsing**
- (xii) one empty container, labelled **waste**
- (xiii) 20 cm³ of each of two solutions of calcium chloride, **X1** and **X2**.

The two solutions should be presented to candidates in two separate small beakers, labelled **X1** and **X2**.

X1 is a 1% solution. It is made by dissolving 10g of solid hydrated calcium chloride (CaCl₂·6H₂O) into 900 cm³ of distilled water, which is then made up to 1000 cm³ with distilled water. This is enough for 50 candidates.

If $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ is not available, one of the following alternatives could be added to 900 cm^3 of distilled water instead:

$\text{CaCl}_2 \cdot 4\text{H}_2\text{O}$, use 8.4 g

$\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$, use 6.7 g

$\text{CaCl}_2 \cdot \text{H}_2\text{O}$, use 5.9 g

CaCl_2 anhydrous, use 5.1 g

X2 is a 0.1% solution. 100 cm^3 of the 1% solution (above) can be diluted down by adding 900 cm^3 of distilled water. This is enough for 50 candidates.

- (xiv) access to paper towels (in case of spillages)
- (xv) view of a clock or timer that allows candidates to time seconds accurately
- (xvi) eye protection

Before the examination, the Supervisor must try out this part of the investigation.

It is important that the times for clotting are trialled before the examination using 5 cm^3 of fresh milk mixed with 1 cm^3 of the enzyme solution. They should be mixed in a large test-tube at 40°C . When gently tipped, small clots should appear on the inside of the tube as shown at stage **C** in Fig. 1.

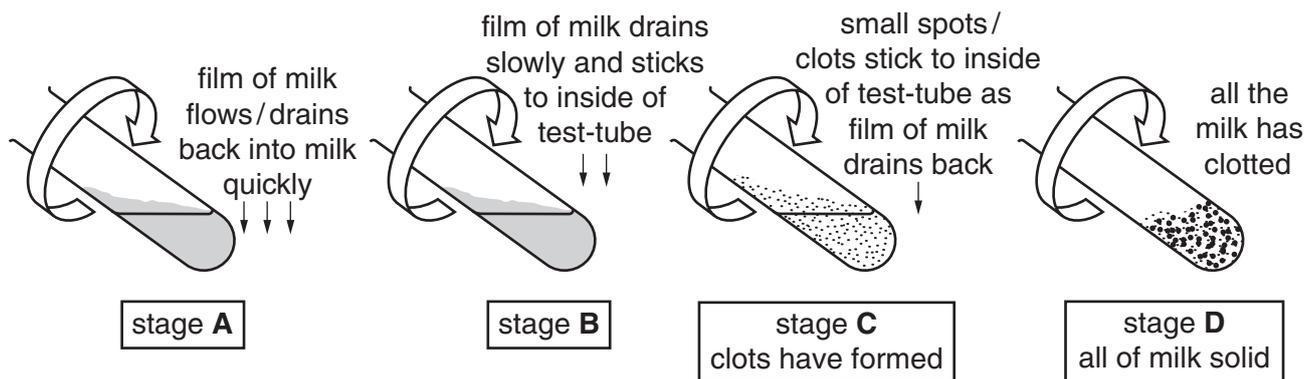


Fig. 1

Clotting time without any calcium chloride solution should be between one and three minutes. If longer or shorter, adjust the enzyme concentration by making it more or less concentrated as appropriate.

The Supervisor (**not** the Invigilator) should carry out the practical aspects of **Question 1** and record their results in the space provided in the Supervisor's Report. This must be done during the examination, using the same apparatus and reagents as the candidates but **out of sight** of the candidates.

Question 2

Each candidate should be provided with:

- (i) one leaf, which is broad and flat, of a simple shape with smooth edges, presented standing in a small beaker of water (to prevent it from drying out)

Examples of suitable leaves are shown in Fig. 2.



Fig. 2

- (ii) one ruler (with mm scale)
- (iii) one hand lens (at least $\times 6$ magnification)

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This form must be completed and returned to CIE with the scripts.

REPORT ON PRACTICAL BIOLOGY

The Supervisor should provide the following information.

- 1** Was any difficulty experienced in providing the necessary materials? If so, give brief details.

.....

- 2** Give details of any difficulties experienced by particular candidates, giving names and candidate numbers. Reference should be made to:

(a) difficulties with specimens or materials;

.....

(b) accidents to apparatus or materials;

.....

(c) assistance provided in case of colour blindness;

.....

.....

(d) any other information that is likely to assist the Examiner, especially if this cannot be discovered from the scripts.

.....

Other cases of individual hardship, e.g. illness or disability, should be reported direct to CIE on the normal 'Special Consideration Form' as detailed in the Handbook for Centres.

- 3** During the examination, the Supervisor should, **out of sight of the candidates**, carry out the practical aspects of **Question 1**, using the same apparatus and reagents as the candidates. Results should be recorded in the space on page 8 (**not** on a spare Question Paper). Attach extra sheets if necessary.

The Invigilator should **not** carry out **Question 1**.

Please attach a photograph (or detailed line drawing) of a typical leaf given to candidates for **Question 2**.

- 4 A plan of work benches, giving details of the candidate numbers for the places occupied by the candidates for each session, must be enclosed with the scripts.

Declaration (to be signed by the Principal or the Examinations Officer)

The preparation of this practical has been carried out so as to maintain fully the security of the examination.

Signed

Name (in block capitals)

Centre number

Centre name

If scripts are required to be despatched in more than one packet, it is essential that a copy of the Supervisor's Report and the appropriate seating plan(s) are inside **each packet**.