



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
Cambridge International Level 3 Pre-U Certificate
Principal Subject

BIOLOGY

9790/03

Paper 3 Practical Examination

May/June 2013

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given does not reach the candidates either directly or indirectly.



This document consists of **8** printed pages.



Instructions for preparing apparatus

These instructions give details of the apparatus and materials required by each candidate for this paper. Sufficient information is given to permit the Centre to set up and test the apparatus and materials so that the candidates can be fairly assessed. **No access to the question paper is permitted in advance of 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 on the supervisor's report.

Candidates must be provided with a microscope with:

- low-power objective lens, e.g. $\times 10$ (equal to 16 mm or 2/3")
- high-power objective lens, e.g. $\times 40$ (equal to 4 mm or 1/6")
- eyepiece graticule fitted within the eyepiece and visible in focus at the same time as the specimen.

Each candidate should have sole, uninterrupted use of the microscope for at least 35 minutes.

HEALTH AND SAFETY

Supervisors are advised to remind candidates that **all** substances in the examination should be treated with caution. Only those tests described in the Question Paper should be attempted. Pipette fillers and safety goggles should be used when necessary.

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

Attention is drawn in particular to certain materials used in the examination. The following codes are used where relevant.

C = corrosive substance

H = harmful or irritating substance

T = toxic substance

F = highly flammable substance

O = oxidising substance

N = dangerous to the environment

The attention of Supervisors is drawn to any local regulations relating to safety, first-aid and disposal of chemicals.

'Hazard Data Sheets', relating to materials used in this examination, should be available from your chemical supplier.

Instructions to Supervisors

Each candidate must be provided with the following apparatus and materials.

To be supplied by the Centre:

Question 1

Each candidate will require, for a period of 90 minutes:

- (i) 5 cm³ of DCPIP solution in a small beaker labelled **DCPIP solution**.

Prepare as follows:

Dissolve 0.2 g of 2,6-dichlorophenolindophenol (DCPIP) and 0.9 g of potassium chloride in 250 cm³ of the **buffer solution**. Refrigerate until required. Provide to the candidates in a small beaker labelled **DCPIP solution**.

Prepare the buffer solution as follows:

Prepare 500 cm³ of pH 7.0 **buffer solution** by dissolving 4.5 g of disodium hydrogenphosphate [Na₂HPO₄] and 1.7 g of potassium dihydrogenphosphate [KH₂PO₄] in 450 cm³ of distilled water. When fully dissolved, make up to a total volume of 500 cm³ with distilled water (or deionised water). Check the pH of the buffer and adjust if necessary. The addition of potassium dihydrogenphosphate will lower pH, disodium hydrogenphosphate will raise pH.

The buffer solution will be used to make both the DCPIP solution and the chloroplast suspension.

- (ii) 10 cm³ of chloroplast suspension in a small beaker (20 or 25 cm³) labelled **chloroplast suspension**.

This must be prepared on the day of the practical examination and kept cold until the candidates start question 1.

Prepare as follows:

Dissolve 13.7 g of sucrose and 0.1 g of potassium chloride in 100 cm³ of the **buffer solution**. Refrigerate until required.

Take some spinach leaves and remove any midrib or large veins with scissors. Cut the remaining leaf material into small pieces. Add approximately 15 g of the leaves to the buffered solution of sucrose and potassium chloride and liquidise to separate and disrupt the cells. Filter this leaf extract through muslin and decant the green liquid obtained into a beaker.

The chloroplast suspension should be placed in a refrigerator before being provided to each candidate in a suitable container labelled **chloroplast suspension**. This container should be provided to each candidate in a beaker of ice and water.

The candidates should keep the chloroplast suspension ice-cold while they carry out the procedure.

- (iii) Twenty 100 mm melting point tubes to act as capillary tubes in the procedure. Spare tubes should be available if candidates need them. They should be told that there are plenty available.

- (iv) Six different filters (as supplied by CIE), each folded longitudinally to form a 'tent' to cover the melting point tubes, as shown in Fig. 1.1.

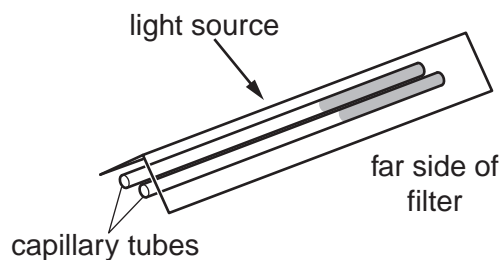


Fig. 1.1

- (v) Rectangle of foil cut to an appropriate size to wrap around the beaker.
- (vi) Circular foil cap to cover the beaker.
- (vii) Stiff black card (140 mm × 60 mm), aluminium foil of the same dimensions, scissors.
- (viii) Bunsen burner, tripod and gauze, 2 test-tubes, 400 cm³ beaker to use as a water bath.
- (ix) Ruler (cm/mm).
- (x) Glass rod, thermometer, 1 cm³ syringe, 5 cm³ syringe, test-tube rack to accommodate test-tubes.
- (xi) White tile, marker pen.
- (xii) Dropping pipette.
- (xiii) Stopwatch, stop clock or bench timer.
- (xiv) Bench lamp – all candidates should use lamps with the equivalent of 60W bulbs.
- (xv) Paper towels.
- (xvi) Beaker for waste, labelled **waste**.

Question 2

Each candidate must have sole, uninterrupted use of a microscope for at least 35 minutes.

- (i) Hand lens, e.g. $\times 10$.
- (ii) One complete gill arch from a mackerel as shown in Fig. 2.1 and supplied to the candidates in water in a Petri dish. Do **not** use the first pair of gill arches as these have gill rakers.



Fig. 2.1

- (iii) Ruler (cm/mm).
- (iv) Forceps, mounted needle.
- (v) Bench lamp.
- (vi) White tile.
- (vii) Paper towels.

To be supplied by CIE:

Question 1

- (i) Six filters per candidate. These **do not** need to be returned to CIE after the practical examination.

Question 2

- (i) Slides **K2** and **K3**.
- (ii) Eyepiece graticules.
- (iii) Slide micrometers.

RETURN OF EXAMINATION MATERIALS TO CIE

Please read the following instructions carefully.

Immediately after the examination the slides must be returned to CIE in the containers in which they were received, using the self-adhesive labels for the parcel. They must not be included in parcels of scripts.

Please clearly indicate your Centre number when returning slides.

Slides and containers not returned in good condition will be charged at the rate of £3 per item.

The address for the return of slides is:

Ian Couchman
Cambridge Assessment DC10
Hill Farm Road
Whittlesford
CAMBRIDGE
CB22 4FZ

The slides may be purchased from CIE rather than being returned, using the form enclosed with the slides.

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This form should be completed and sent to the Examiner with the scripts.

REPORT ON PRACTICAL BIOLOGY

Pre-U

May/June Session 2013

The Supervisor or Teacher responsible for the subject 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 arising from faulty specimens or microscopes;
 - (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.

All other cases of individual hardship, e.g. illness or disability, should be reported direct to CIE on the normal 'Application for Special Consideration Form'.



- 3. Results for question 1. These should be obtained by the Supervisor or other competent biologist. Separate results should be provided for each session held, each laboratory used in that session, and each set of materials supplied.

- 4. Enclose a plan of work benches with the scripts, giving details of the candidate numbers for the places occupied by the candidates for each session.

Declaration (to be signed by the Principal)

The preparation of this practical examination 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 by CIE to be despatched in more than one envelope, it is essential that a copy of the relevant Supervisor's report and the appropriate seating plan(s) are sent inside **each envelope**.

