



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

BIOLOGY

9790/04

Paper 4 Practical

May/June 2011

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 $\frac{2}{3}$ ")
- High-power objective lens, e.g. $\times 40$ (equal to 4 mm or $\frac{1}{6}$ ")
- 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. Supervisors are advised to remind all candidates that all substances in the examination should be treated with caution. Pipette fillers and safety goggles should be used when necessary.

HEALTH AND SAFETY

Attention is drawn to the section on Health and Safety in the Pre-U Biology Syllabus. This section covers the Practical Examination as well as the practical work that is done during the course. Centres are reminded that, in UK law, the responsibility for Health and Safety lies with the employer.

Materials used in the examination should display appropriate internationally agreed hazard symbols.

Risk assessments by Centres of chemical and materials as well as labelling of chemicals and materials and provision of safety equipment should follow the legislation in force in the country in which the examination is conducted.

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

The following codes are used where relevant.

- C** = corrosive substance
- H** = harmful or irritating substance
- F** = highly flammable substance
- O** = oxidising substance
- T** = toxic substance
- N** = dangerous for the environment

Confidential Instructions

Each candidate must be provided with the following apparatus and materials for **Section A** only.

To be supplied by the Centre.

Question 1

This question requires alginate beads containing immobilised lactase.

These should be prepared as follows.

The quantities given below are sufficient for four candidates.

Prepare 100 cm³ of a 2% sodium alginate solution.

- Add 2 g sodium alginate to some warm distilled water and stir. Make up to 100 cm³ with more warm distilled water and stir thoroughly until all the sodium alginate has dissolved. It is advisable to do this well in advance and leave the solution to stand for several hours or overnight.

Mix the sodium alginate solution with lactase.

- Add 24 cm³ of the liquid preparation of lactase (*Lactozyme*®) to 100 cm³ of the 2% sodium alginate solution and stir thoroughly.

A fresh supply of *Lactozyme*® **must** be obtained from the NCBE for this examination. **No other source of lactase should be used.** See page 5 for details.

You **must** follow the recommended safety and handling precautions provided on the product data sheet.

Prepare 100 cm³ of 1.5% calcium chloride solution.

- Add 80 cm³ distilled water to 1.5 g of calcium chloride and stir until dissolved. Make up to 100 cm³ with more distilled water.

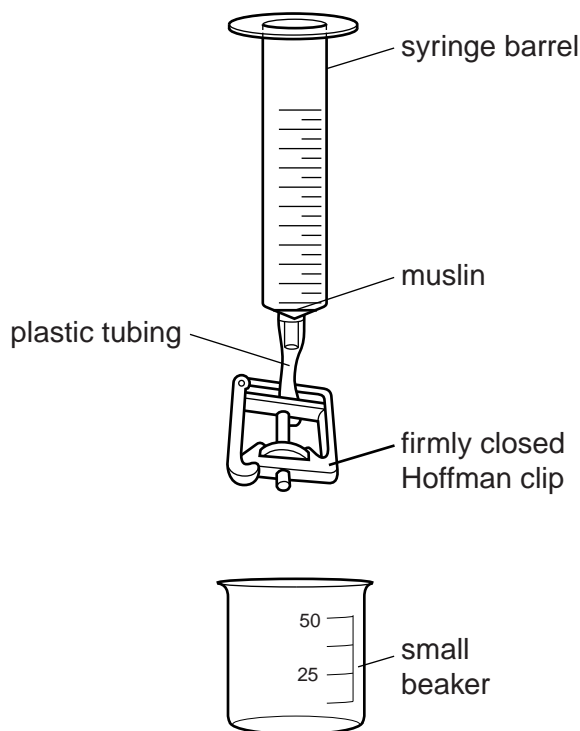
The beads should be prepared by filling a plastic syringe with the sodium alginate/lactase mixture and applying sufficient pressure to deliver drops of the mixture into the calcium chloride solution. Filter the beads from the calcium chloride solution and wash them in distilled water. Do not use any misshapen beads or beads with air bubbles. Beads may be made the day before the examination and kept in a sealed container in the refrigerator.

Ensure that each candidate has access to extra beads if required.

Each candidate will require:

- (i) Three barrels from 10 cm³ syringes. Each to be prepared as follows and as shown in Fig. 1.1.

- 1 cm² of muslin or similar material placed inside the barrel above the entrance to the nozzle to prevent the beads blocking it.
 - Approximately 70 mm of clear tubing (e.g. PVC) of 3 mm bore attached to the nozzle.
 - A Hoffman clip placed over the tubing about 10 to 15 mm from the end of the nozzle, and firmly closed to prevent liquid escaping.
 - The syringe barrel clamped to a retort stand.
- All three barrels can be clamped to the same retort stand.
- A small 25 cm³ or 50 cm³ beaker underneath each barrel.



- One of the three barrels should be left without immobilised lactase beads inside.
- 10 cm³ of immobilised lactase beads should be added to each of the other **two** syringe barrels.

Fig. 1.1

- (ii) 50 cm³ semi-skimmed milk in a beaker labelled **milk**. This should be provided at room temperature. More milk should be available in case candidates require it.
- (iii) A beaker containing 20 cm³ immobilised lactase beads labelled **immobilised lactase**.
- (iv) 3 small beakers, e.g. 25 cm³ or 50 cm³; 3 × 10 cm³ syringes; measuring cylinder (25 cm³ or 50 cm³).
- (v) Thermometer; spatula; marker pen; stopwatch, stop clock or bench timer.
- (vi) Diastix® test strips. These should be supplied in the original plastic bottle or in a stoppered glass or plastic specimen (sample) tube. A colour chart is provided on the Question Paper.
- (vii) White tile.
- (viii) 250 cm³ beaker of distilled water labelled **distilled water**.
- (ix) Beaker for waste water labelled **waste**.
- (x) Paper towels.

Lactozyme® **must** be sourced from:
 National Centre for Biotechnology Education,
 Science and Technology Centre,
 Earley Gate,
 The University of Reading,
 Whiteknights,
 Reading,
 RG6 6BZ
 Tel: 0118 9873 743
 Fax 0118 9750 140
 e-mail: NCBE@reading.ac.uk
 website: www.ncbe.reading.ac.uk

Diastix® test strips may be bought from high street chemists or from Timstar (TS7206)

Sodium alginate
 SO380 (25 g)

Sodium alginate
 SO5448 (25 g)
 SO5450 (100 g)

Scientific & Chemical Supplies Ltd., Carlton
 House, Livingstone Road, Bilston, West
 Midlands, W14 0QZ. Tel 0845 1650845;
 Fax 01902 402343;
 e-mail: customerservices@scichem.co.uk; web
 site: www.scichem.co.uk

Timstar Laboratory Suppliers Ltd., Timstar
 House, Marshfield Bank, Crewe, Cheshire,
 CW2 8UY. Tel 01270 250459. Fax 01270 250601;
 e-mail: sales@timstar.co.uk;
 website: www.timstar.co.uk

The Supervisor should, **out of the sight of the candidates**, carry out **Question 1** and write the **results** in the Supervisor's report which should be enclosed with the candidates' scripts. Please ensure that if the scripts are in several packets, a copy of the Supervisor's report is enclosed with each packet of scripts. The invigilator should **not** carry out **Question 1**.

Question 2

Each candidate will require, for a period of at least 35 minutes:

- (i) Slide **P1** (supplied by Cambridge).
- (ii) Slide **P2** (supplied by Cambridge).
- (iii) Hand lens (e.g. × 10).
- (iv) Microscope as described on page 2.
- (v) Plastic ruler (cm/mm).

On receipt of the slides, please check that they are labelled **P1** and **P2** and that all slides are intact. The identity of material on the slides is **confidential** and must **not** be disclosed to candidates.

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

RETURN OF EXAMINATION MATERIALS TO CAMBRIDGE

Immediately after the examination, microscope slides **must** be returned to CIE in the containers in which they were received, using the self-adhesive label for the parcel. They must **not** be included in the parcel of scripts. It may be possible to buy the slides, in which case an order form will be enclosed with the slides, and should be returned to CIE using the self-adhesive label for the letter. Slides and containers not returned in good condition will be charged at a rate of £4 per item to which administrative costs may be added.

REPORT FORM

The teacher responsible for the examination is asked to fill in the Report Form on pages 7 and 8 of these Confidential Instructions. For Centres where more than one script envelope is used, there must be a copy of the complete Report Form in each script parcel.

These Report Forms are vital in order to allow the Examiners to assess all candidates as fairly as possible and should always be completed by every Centre.

A copy of the seating plan for the examination room must also be enclosed in each script parcel.

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

REPORT ON PRACTICAL BIOLOGY

A Level

May/June Session 2011

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 'Special Consideration Form' as detailed in Part 6 of the Handbook for Centres.



3. Results for question 1.

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**.

