



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/53**

Paper 5 Practical Test

**October/November 2013**

CONFIDENTIAL INSTRUCTIONS

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

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**The Supervisor's attention is drawn to the form on page 8 which must be completed and returned with the scripts.**

If you have any queries regarding these instructions, please contact CIE

by e-mail: [info@cie.org.uk](mailto:info@cie.org.uk)

by phone: +44 1223 553554

by fax: +44 1223 553558

stating the nature of the query and the syllabus number quoted above.

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This document consists of **7** printed pages and **1** blank page.



## Instructions for preparing apparatus

These instructions detail the apparatus, reagents and specimens 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 teacher to test the apparatus appropriately. **No access is permitted to the question paper in advance of the examination session.**

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. Only those tests described in the Question Paper should be attempted. 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

**T** = toxic substance

**N** = harmful to the environment

The attention of Centres 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.

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

Centres are reminded that they are **not** permitted to open the question paper envelopes before the examination. Centres are also referred to the Handbook for Centres, the Security of Question Papers and Examination Materials section and the Practical Examinations in Science Subjects section.

If there are 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](mailto:info@cie.org.uk), by phone to +44 1223 553554 or by fax to +44 1223 553558.

**For Question 1**

Each candidate will require:

- (i) two Petri dishes with lids, labelled **A** and **B**, containing a starch-agar gel on which there are living barley grains (see **note** over page)
- (ii) two Petri dishes with lids, labelled **C** and **D**, containing a starch-agar gel on which there are dead barley grains (see **note** over page)
- (iii) iodine solution in a dropping bottle, or other container with a dropping pipette available, labelled **iodine solution**
- (iv) two white tiles
- (v) knife or spatula
- (vi) tweezers
- (vii) two large test-tubes (approximately 150 x 25 mm), and a means to support them
- (viii) a means of labelling the test-tubes
- (ix) access to Benedict's solution in a dropping bottle, or other container with a dropping pipette available, labelled **Benedict's solution**
- (x) candidates should have access to a very hot (simmering) water bath. They should have means to support their test-tubes in the water
- (xi) a stopclock or a timer with a seconds hand
- (xii) a container for waste, labelled **waste**.

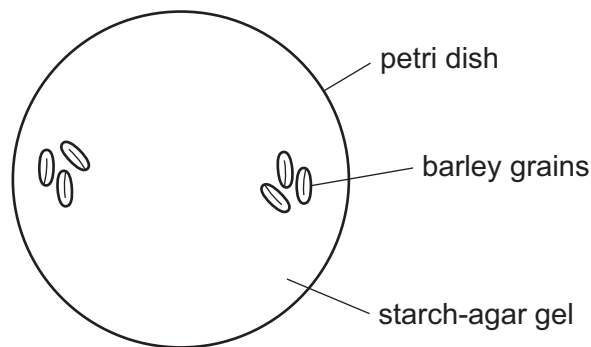
**Note:** Prepare the Petri dishes as follows:

**Six days before the examination:**

- Soak the barley grains (seeds/fruits) for 48 hours in water: up to 30 grains are needed per candidate. This will allow 24 grains per candidate plus extra for contingencies.
- Leave the grains for a further 48 hours on moist cotton wool (keeping the cotton wool damp).
- Divide the barley grains into two equal batches. One of these two batches of barley grains should be killed by placing in a beaker of water and heating the water to boiling point.

**Two days before the examination:**

- Make a starch-agar gel, using 1g agar and 0.25g starch per 100cm<sup>3</sup> water. Mix thoroughly, and then slowly bring to the boil. Before the mixture solidifies, pour the starch-agar mixture into four Petri dishes for each candidate.
- Allow the starch-agar mixture to cool.
- Label the lids of the dishes **A**, **B**, **C** and **D**.
- For dishes **A** and **B**, place two groups of three living barley grains on either side of the agar gel, as shown in Fig. 1.1.
- For dishes **C** and **D**, place two groups of three boiled barley grains on either side of the agar gel, as shown in Fig. 1.1.
- Add a drop of water to each of the groups of three grains.
- Place the labelled lids on the Petri dishes so that the lids labelled **A** and **B** are placed on the living barley grains and the lids labelled **C** and **D** are placed on the dead barley grains. Leave them in a warm place (e.g. in an incubator at 30 °C) for two days.



**Fig. 1.1**

**For Question 2**

Each candidate will require:

- (i) metre rule with a millimetre scale
- (ii) a knife edge. This can be a prism or wooden block placed on the bench
- (iii) a 15, 30 or 50 cm ruler with a millimetre scale
- (iv) a 150 g load, labelled **M**. This can be made from a combination of slotted masses taped together.

**Note:** It is assumed that all candidates will use similar rules, unless stated otherwise by the supervisor.

**For Question 3**

Each candidate will require:

- (i) about  $10\text{ cm}^3$  of a mixture, labelled **X**, of equal volumes of approximately  $0.1\text{ mol dm}^{-3}$  iron(III) chloride and approximately  $0.1\text{ mol dm}^{-3}$  copper(II) sulfate
  - (ii) 7 test-tubes, approximately  $125 \times 15\text{ mm}$  (Centres may provide fewer test-tubes to a minimum of 2; if fewer test-tubes are used, candidates will have to rinse test-tubes with distilled water which must be provided)
  - (iii) filter funnel
  - (iv) at least two pieces of filter paper
- [C] (v) about  $5\text{ cm}^3$  of dilute nitric acid, approximately  $1.0\text{ mol dm}^{-3}$ , labelled **dilute nitric acid**
- [H] (vi) about  $20\text{ cm}^3$  of sodium hydroxide solution, approximately  $0.40\text{ mol dm}^{-3}$ , labelled **sodium hydroxide solution**
- (vii) about  $20\text{ cm}^3$  of ammonia solution, approximately  $2.0\text{ mol dm}^{-3}$ , labelled **ammonia solution**
- (viii) about  $20\text{ cm}^3$  of sodium carbonate solution, approximately  $1.0\text{ mol dm}^{-3}$ , labelled **sodium carbonate solution**
- [N][H] (ix) about  $5\text{ cm}^3$  of silver nitrate solution, approximately  $0.05\text{ mol dm}^{-3}$ , labelled **silver nitrate solution**
- (x) about  $5\text{ cm}^3$  of barium chloride solution, approximately  $0.1\text{ mol dm}^{-3}$ , labelled **barium chloride solution**
- (xi) dropping pipettes
- (xii) small measuring cylinder ( $5\text{ cm}^3$ ,  $10\text{ cm}^3$  or  $20\text{ cm}^3$ )
- (xiii) a test-tube rack.

Spare materials and equipment should be available and can be provided without penalty. **Candidates should be made aware of this.**

*Information required from the Supervisor:*

**The Supervisor is asked to carry out the experiments and to enter the results on a spare copy of the examination paper, clearly marked 'Supervisor's Results' and showing the Centre number. This should be done, out of sight of the candidates, using the same solutions, reagents, specimens and apparatus as the candidates.**

**A copy of the 'Supervisor's Results' should be returned with each packet of scripts. Failure to do so may cause the candidates to be penalised.**

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**This form must be completed and returned in the envelope with the scripts together with the seating plan and the Supervisor's Results as mentioned on page 6.**

**October/November 2013**

*General*

The Supervisor is invited to give details of any difficulties experienced by particular candidates giving their names and candidate numbers. These should include reference to:

- (a) difficulties due to faulty apparatus;
- (b) accidents to apparatus or materials;
- (c) physical handicaps, e.g. short sight, colour blindness;
- (d) any other information that is likely to assist the Examiner, especially if this cannot be discovered in the scripts;
- (e) any help given to a candidate.

*The Supervisor is asked to supply the following information:*

Plan of work benches, giving details by candidate numbers of the places occupied by the candidates for each session and a copy of the 'Supervisor's Results'.

NAME OF CENTRE .....

SIGNED .....  
Supervisor

CENTRE NUMBER .....

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.

NAME .....  
(in block capitals)

SIGNED ..... (Principal)



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