
PHYSICAL SCIENCE

8780/04

Paper 4 Advanced Practical Skills

October/November 2015

CONFIDENTIAL INSTRUCTIONS

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

No access to the Question Paper is permitted in advance of the examination.



The Supervisor's attention is drawn to the form on pages 7 and 8 which must be completed and returned with the scripts.

If you have any problems or queries regarding these Instructions, please contact CIE

by e-mail: International@cie.org.uk

by phone: +44 1223 553554

by fax: +44 1223 553558

stating the Centre number, the nature of the query and the syllabus and paper number.

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

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 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 hazard codes are used where relevant.

[C] corrosive substance	[F] highly flammable substance
[H] harmful or irritating substance	[O] oxidising substance
[T] toxic substance	[N] dangerous for 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.

Before the Examination

- 1 These Instructions detail the apparatus required for the experiments in the Question Paper. **Access to the Question Paper is NOT permitted in advance of the examination.** The contents of these Confidential Instructions must not be revealed either directly or indirectly to the candidates.
- 2 **Preparation of materials**
Where quantities are specified for each candidate, they are sufficient for the experiments described in the Question Paper to be completed.
In preparing materials, the bulk quantity for each substance should be increased by 25% as spare material should be available to cover accidental loss. More material may be supplied if requested by candidates, without penalty.
All solutions should be bulked and mixed thoroughly before use to ensure uniformity.
Every effort should be made to keep the concentrations accurate to within one part in two hundred of those specified.
If the concentrations differ slightly from those specified, the Examiners will make the necessary allowance. They should be informed in the Supervisor's Report of the exact concentrations.
- 3 **Labelling of materials**
Materials must be labelled as specified in these Confidential Instructions. It may be required for some materials to be labelled but **without** the identities being included on the label.
It should be noted that descriptions of materials given in the Question Paper may not correspond with the specifications in these Instructions. **The candidates must assume the descriptions given in the Question Paper.**
- 4 **Size of group**
In view of the difficulty in preparing large quantities of solution of uniform concentration, it is recommended that the maximum number of candidates per group be 30 and that separate supplies of solutions be prepared for each group.
- 5 **Number of sets of apparatus**
The minimum number of sets of apparatus provided for each experiment is half the number of candidates taking the examination. There should, in addition, be a few spare sets of apparatus available in case problems arise during the examination.

The Examination

1 Organisation of the examination

Essential Information relating to the conduct and invigilation of the Practical Examination is given in the Handbook for Centres.

Candidates should be allowed access to the apparatus for each experiment for 45 minutes only. After spending 45 minutes on one experiment, candidates should change over to the other experiment. The order in which a candidate attempts the two experiments is immaterial.

2 Assistance to candidates

Supervisors should make the following announcement at the start of the examination:

'The Examiners do not want you to waste time when you are unable to do any experiment.

Any candidate who is unable to get results with an experiment may ask for help. The extent of this help will be reported to the Examiners, who may make a deduction of marks.'

Assistance should only be given when it is asked for by a candidate, or as directed in the Notes sections of these Instructions, or where apparatus is seen to have developed a fault. Assistance should be restricted to enabling candidates to make observations and measurements. Observations and measurements must not be made for candidates, and no help should be given with data analysis or evaluation.

All assistance given to candidates must be reported on the Supervisor's Report Form.

3 Colour blindness

It is permissible to advise candidates who request assistance on colours of, for example, precipitates and solutions (especially titration end-points). Please include with the scripts a note of the candidate numbers of such candidates. Reporting such cases with the scripts removes the need for a 'Special Consideration' application.

Candidates who are red/green colour-blind do not generally have significant difficulty.

4 Faulty apparatus

In cases of faulty apparatus that prevents the required measurements from being taken, the Supervisor may allow extra time to give the candidate a fair opportunity to perform the experiment as if the fault had not been present.

5 Supervisor's Results

If asked to do so in the Confidential Instructions, the Supervisor, or other competent Physical Scientist, should carry out the required experimental work **out of sight of the candidates**. Access to the Question Paper is NOT permitted in advance of the examination.

Supervisor's Results are required for each session and each laboratory used in that session, and each set of solutions supplied. The Question Paper cover requests candidates to fill in details of the examination session and the laboratory used for the examination. It is essential that each packet of scripts contains a copy of the Supervisor's Results as the candidate's work cannot be assessed accurately without such information.

After the examination

Each envelope returned to Cambridge must contain the following items:

- 1 the scripts of those candidates specified on the bar code label provided,
- 2 a copy of the Supervisor's Results if required by the Confidential Instructions,
- 3 the Supervisor's Report, including details of any difficulties experienced by candidates (see pages 7 and 8),
- 4 the Attendance Register,
- 5 a plan of work benches, giving details by candidate number of the places occupied by the candidates for each experiment and session.

Instructions for Preparing Apparatus and Materials

In addition to the fittings ordinarily contained in a Science laboratory, the apparatus and materials specified below will be necessary.

Question 1

Apparatus requirement (per candidate unless otherwise stated)

- one metre rule
- one clamp stand
- two bosses
- two clamps
- one tray (see note 1)
- sand (see note 2)
- 150 ml beaker of spare sand
- one marble (see note 3)
- one 30 cm ruler
- one set square
- two lengths of splint of length about 5 cm

Notes

- 1 Each set of apparatus should be set up by the Supervisor as shown in Fig. 1.1. The tray should be of minimum size 20 cm by 20 cm and should be between 4 cm and 6 cm deep. A seed tray (with any drainage holes blocked) is suitable. The metre rule should be set up so that the 0 cm mark is touching the bench.

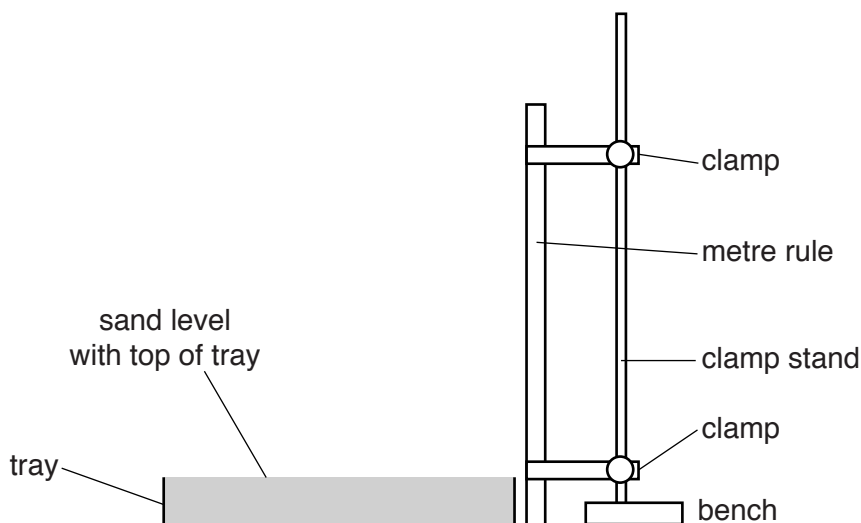


Fig. 1.1

- 2 The sand should be 'silver sand', or other fine sand. The sand needs to be dried out in an oven so that it flows freely. If the atmosphere is damp then fresh sand should be supplied for each candidate. The sand should be put in the tray and smoothed out, so that it is level with the top of the tray. It will help if the sand tray is placed in a much larger tray or on a large sheet of paper so that the sand does not contaminate the bench. The spare sand may be used by the candidate to replace sand lost in the smoothing process.

3 The marble should have a diameter of about 1.5 cm.

Action required at change over

Check the apparatus is set up as in the instructions above. Smooth the sand.

Information required by the Examiners

The diameter of the marble to the nearest millimetre.

Question 2

Under no circumstances must the concentration of the sulfuric acid be divulged to candidates.

Apparatus required (per set of apparatus unless otherwise specified)

- 1 × 250 cm³ beaker (this needs to be large enough for the Styrofoam cup to fit inside it)
- 1 × Styrofoam (polystyrene) cup of at least 200 cm³ capacity
- 1 × pipette
- 1 × pipette filler
- 1 × 50 cm³ burette
- 1 × clamp and stand (or burette stand)
- 1 × small funnel for filling the burette
- 1 × stirring thermometer capable of reading -5°C to $+50^{\circ}\text{C}$ at 0.2° divisions
- paper towels

Chemicals

See table on page 6.

Notes

- 1 Spare materials and equipment should be available and can be provided without penalty.
Candidates should be made aware of this.
- 2 Safety goggles and disposable plastic gloves should be used where necessary.

Chemicals required for Question 2

Particular requirements

hazard*	label	per candidate	identity	notes*
[C]	2M sodium hydroxide	50 cm ³ of solution in a suitable container	sodium hydroxide 2.00 mol dm ⁻³	Dissolve 80.0 g of NaOH [C] in each dm ³ of solution. Fresh solid NaOH pellets, with no accumulated crust of sodium carbonate from exposure to damp air, should be used. When kept for 24 hours to equilibrate at room temperature, the NaOH(aq) should be kept in a stoppered container to avoid absorption of carbon dioxide. Care – <i>the process of solution is exothermic and any concentrated solution is very corrosive.</i>
[C]	sulfuric acid	100 cm ³ of solution in a suitable container	sulfuric acid 0.95 mol dm ⁻³	Carefully add 55 cm ³ concentrated sulfuric acid [C] to 500 cm ³ of distilled water and then make up to 1 dm ³ with distilled water. THE CONCENTRATED ACID MUST BE ADDED TO THE WATER AND NOT THE OTHER WAY ROUND.
These two solutions must be kept for 24 hours in the same room before the examination to ensure that they are both at the same temperature.				

*Hazard symbols given are for the raw materials

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

SUPERVISOR'S REPORT FORM

The Supervisor's Report should give full details of:

- (a)** any help given to a candidate (including the nature of the help given and the name and candidate number of the candidate),
- (b)** any cases of faulty apparatus (including the nature of the problem, the action taken to rectify it, any additional time allowed, and the name and candidate number of the candidate),
- (c)** assistance provided in the case of colour blindness,
- (d)** any other difficulties experienced by candidates, or any other information that is likely to assist the Examiner, especially if this information cannot be discovered in the scripts.

Cases of individual hardship, such as illness, bereavement or disability, should be reported direct to CIE on the normal Special Consideration form.

Supervisor's Report



Information required by Examiners

1. A sample set of numerical results, clearly marked 'Supervisor's Results'. These may be recorded on a spare copy of the Question Paper.
2. Diameter of marble supplied to candidates for Question 1cm.
3. A plan of work benches for each session/laboratory.

Declaration (to be signed by the Supervisor)

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, Supervisor's Results and the appropriate seating plan(s) are sent inside **each** envelope.

