

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CHEMISTRY

9701/03

Paper 3 Practical Test

October/November 2006

CONFIDENTIAL INSTRUCTIONS

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

READ THESE INSTRUCTIONS FIRST

- 1 Access to the examination paper is not permitted before the examination.**

Supervisors are asked to carry out any confirmatory tests included in the Instructions to ensure the materials supplied are appropriate.

The 'General Apparatus' requirements and the 'Particular Requirements' are printed separately. It is *especially important* that the details of page 4 are kept secure.

- 2** 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. Please also see under 'General Apparatus' on the use of pipette fillers and safety goggles.

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.

Attention is drawn, in particular, to certain materials used in the examination. 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

The Supervisor's attention is drawn to the form on page 7 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 number quoted above.

This document consists of 8 printed pages.

UNIVERSITY OF CAMBRIDGE

Safety

The attention of Supervisors is drawn to any local regulations relating to safety and first-aid. 'Hazard Data Sheets', relating to materials used in this examination, should be available from your chemical supplier.

General Apparatus

- 1 In addition to the fittings and reagents ordinarily contained in a chemical laboratory, the apparatus and materials specified below will be necessary.
- 2 **It is assumed that the following are available.**
bench solutions (2mol dm^{-3}) of hydrochloric acid, sodium hydroxide and aqueous ammonia
the reagents and equipment to enable tests to be performed to detect the gases listed in the syllabus
- 3 Pipette fillers and safety goggles should be used where necessary.

For each candidate

- 2 \times 50 cm³ burettes
- 2 \times stands and burette clamps
- 1 \times small funnel for filling burettes
- 1 \times 25 cm³ pipette
- 1 \times pipette filler (or equivalent safety device)
- 1 \times 250 cm³ graduated flask (labelled **FA 5**)
- 2 \times titration (conical) flasks (250 cm³)
- 1 \times measuring cylinder (to measure 25 cm³)
- 1 \times white tile
- 1 \times filter funnel
- 2 \times medium grade filter papers
- 1 \times Bunsen burner
- 1 \times heat proof mat
- 1 \times test-tube rack
- 1 \times test-tube holder
- 4 \times test-tubes
- 5 \times boiling-tubes
- 1 \times 250 cm³ beaker
- 2 \times teat (squeeze) dropping pipettes
- 1 \times wash bottle of distilled water
- 1 \times paper towel
- 1 \times spatula

Particular Requirements

- 1 As a possible aid to maintaining security, the descriptions of the particular chemicals required are given under two headings:
 - (a) overall specifications are given on page 3;
 - (b) the actual identities are given on page 4.
- 2 Materials with an **FA** code number should be so labelled for the candidates' benefit, **without** the identities being included on the label – where appropriate, the identity of an **FA** coded chemical is given in the question paper itself.

Chemicals Required

- 1 The chemicals required per question are described in general terms below.
- 2 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.

- 3 The specific qualitative analysis reagents needed for Question 2 are identified on page 4.

4 Solutions

[H]	FA 1	60 cm ³
[H]	FA 2	150 cm ³
	FA 3	60 cm ³
	FA 4	150 cm ³
	distilled water	400 cm ³
	Bromophenol blue indicator	10 cm ³

Solids

[H]	FA 6	about 3.0 g (provided in a stoppered boiling-tube)
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Detailed Identities of Chemicals Required

1 It is *especially important* that great care is taken that the confidential information given below does not reach the candidates either directly or indirectly.

2 The identities of the chemicals with an **FA** code number are as follows.

[H] **FA 1** is 1.00 mol dm^{-3} hydrochloric acid, HCl.
Prepare the solution by diluting 86 cm^3 of freshly purchased concentrated hydrochloric acid to 1 dm^3 .

[H] **FA 2** is $0.0230 \text{ mol dm}^{-3}$ potassium iodate(V), containing 4.93 g of KIO_3 in each dm^3 of solution.

FA 3 is a 10% (w/v) aqueous solution of potassium iodide, prepared by dissolving 100 g of KI in 1 dm^3 of water.

FA 4 is aqueous sodium thiosulphate prepared by dissolving 34.0 g of $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ in each dm^3 of solution.

*It is recommended that distilled water from which carbon dioxide has been excluded is used in preparing **FA 3** and **FA 4**. Boil the water for a short period to drive off dissolved gases, then allow to cool while covered (e.g. in a beaker covered with "cling-film" or "glad-wrap").*

[H] **FA 6** is a mixture of ammonium chloride and manganese(II) carbonate containing 2 parts by mass of NH_4Cl to 1 part by mass MnCO_3 .
It is recommended that a fresh bottle of manganese(II) carbonate is used.

Bromophenol blue indicator.

0.40 g of the solid indicator should be dissolved in 200 cm^3 of ethanol and the solution diluted to 1 dm^3 with distilled water.

3 **Reagents and materials (e.g. wooden splints) should be available to allow candidates to test for the gases specified in the syllabus.**

In addition to those listed on page 2, the qualitative analysis reagents specifically required are set out below. If necessary these reagents may be made available from a communal supply: however the attention of the Invigilators should be drawn to the fact that such an arrangement may enhance the opportunity for malpractice between candidates.

[T] 0.10 mol dm^{-3} lead(II) nitrate containing 33.30 g dm^{-3} of $\text{Pb}(\text{NO}_3)_2$

[C] 0.05 mol dm^{-3} silver nitrate containing 8.50 g dm^{-3} of AgNO_3

COLOUR BLINDNESS

With regard to colour-blindness – a minor handicap, relatively common in males – 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 index numbers of such candidates.

Experience suggests that candidates who are red/green colour-blind – the most common form – do not generally have significant difficulty. Reporting such cases with the scripts removes the need for a 'Special Consideration' application for this handicap.

Accuracy of Solutions

- 1 **All the solutions are to be labelled as shown and they 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 of the exact concentrations.

- 2 It should also be noted that descriptions of solutions given in the question paper may not correspond exactly with the specification in these Instructions. **The candidates must assume the descriptions given in the question paper.**
- 3 In view of the difficulty of the preparation of 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.

Responsibilities of the Supervisor

- (i) The Supervisor, or other competent chemist **must carry out the experiments in question 1** and complete the table of readings on a spare copy of the question paper which should be labelled 'Supervisor's Results'.

**This should be done for:
each session held and each laboratory used in that session, and
each set of solutions supplied.**

N.B. The question paper cover requests the candidate 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 applicable Supervisor's Results as the candidates' work cannot be assessed accurately without such information.

- (ii) The Supervisor must complete the Report Form on page 7 to show which candidates attended each session. If all candidates took the examination in one session, please indicate this on the Report Form. A copy of the Report Form must accompany each copy of the Supervisor's Results in order for the candidates' work to be assessed accurately.
- (iii) The Supervisor must give details on page 8 of any particular difficulties experienced by a candidate, especially if the Examiner would be unable to discover this from the written answers.

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 Report relevant to the candidates in **1**.
- 3** A copy of the Report Form, including details of any difficulties experienced by candidates (see pages 7 and 8).
- 4** The Attendance Register.
- 5** **A Seating Plan for each session/laboratory.**

Failure to provide appropriate documentation in each envelope may cause candidates to be penalised.

REPORT FORM

This form must be completed and sent to the Examiner in the envelope with the scripts.

Centre Number Name of Centre

1 Supervisor's Results

Please submit details of the readings obtained in Question 1 on a spare copy of the question paper clearly marked 'Supervisor's Results' **and showing the Centre number and appropriate session/laboratory number.**

2 The index numbers of candidates attending each session were:*First Session**Second Session***3 The Supervisor is required to give details overleaf of any difficulties experienced by particular candidates, giving names and index numbers. These should include reference to:**

- (a)** any general difficulties encountered in making preparation;
- (b)** difficulties due to faulty apparatus or materials;
- (c)** accidents to apparatus or materials;
- (d)** assistance with respect to colour-blindness.

Other cases of hardship, e.g. illness, temporary disability, should be reported direct to CIE on the normal 'Application for Special Consideration' form.

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

Report on any difficulties experienced by candidates.

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