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

CHEMISTRY **9701/03**

Paper 3 Practical Test

May/June 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 these 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.

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 bench solutions (2 mol dm^{-3} concentration) of aqueous sodium hydroxide and aqueous ammonia are available and also 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

1 x 50 cm^3 burette
1 x stand and burette clamp
1 x small funnel for filling the burette
1 x 25 cm^3 pipette
1 x pipette filler
1 x 250 cm^3 graduated flask (labelled **FA 3**)
1 x titration flask/conical flask (250 cm^3)
1 x white tile
1 x measuring cylinder to measure 10 cm^3
1 x Bunsen burner
1 x heat-proof mat
1 x test-tube rack
1 x test-tube holder
8 x test-tubes
5 x boiling-tubes
2 x teat (squeeze) dropping pipettes
1 x wash bottle of distilled water
1 x 250 cm^3 beaker (labelled organic waste)
1 x paper towel
1 x 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 For Question 1

[H]	solution **FA 1**	60 cm^3
	solution **FA 2**	150 cm^3
[H]	sulphuric acid	60 cm^3
	aqueous potassium iodide	60 cm^3
	starch indicator	10 cm^3
	distilled water	300 cm^3

For Question 2

	solution **FA 4**	20 cm^3
[H]	solution **FA 5**	20 cm^3
[H]	solution **FA 6**	20 cm^3
	solution **FA 7**	20 cm^3
[T]	2,4-dinitrophenylhydrazine reagent	10 cm^3
[C]	aqueous silver nitrate	10 cm^3
[T]	acidified potassium dichromate(VI)	10 cm^3

FA 4, **FA 5**, **FA 6** and **FA 7** to be provided in stoppered containers e.g. boiling-tubes

Solids

[F]	magnesium powder or turnings	1 g
[H]	anhydrous sodium carbonate (powder)	1 g

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 including those with an **FA** code number are as follows.

Question 1

[H] **FA 1** is a solution containing 42.8 g dm^{-3} potassium iodate, KIO_3.

FA 2 is a solution containing 31.03 g dm^{-3} of sodium thiosulphate-5-water, $Na_2S_2O_3.5H_2O$.
This solution should be prepared as close to the examination as possible.
To prevent precipitation of sulphur from an acidic solution it is recommended that the solid is dissolved in distilled water that has been boiled to expel dissolved gases. The boiled water should be covered (e.g. with 'clingfilm' or 'gladwrap') while cooling.

(**N.B.** the descriptions of **FA 1** and **FA 2** given in the examination paper are not the same as those given in the preparation instructions.)

[H] 1.00 mol dm^{-3} sulphuric acid, labelled as such.
Slowly pour 55 cm^3 of concentrated acid into 500 cm^3 of constantly stirred distilled water and make the resulting solution up to 1 dm^3.

10% aqueous potassium iodide (w/v) labelled as aqueous potassium iodide.
Dissolve 10 g of solid in each 100 cm^3 of solution.

Freshly prepared aqueous starch indicator (2% solution).
Mix 2 g of soluble starch with a little cold water until a smooth paste is obtained. Add 100 cm^3 boiling water and stir. Boil until a clear solution is obtained (about 5 minutes).

Question 2

FA 4 is a 10% (v/v) aqueous solution of propanone (acetone).

[H] **FA 5** is a 10% (v/v) aqueous solution of ethanoic acid (glacial acetic acid).

[H] **FA 6** is a 20% (v/v) aqueous solution of ethanal (acetaldehyde).
This solution should be prepared using freshly purchased ethanal to minimise presence of ethanoic acid.

FA 7 is a 10% (v/v) aqueous solution of ethanol (ethyl alcohol).

[T] Freshly prepared 2,4-dinitrophenylhydrazine reagent (Brady's reagent).
Dissolve 2 g of 2,4-dinitrophenylhydrazine in 15 cm^3 concentrated sulphuric acid. Add 150 cm^3 of ethanol and dilute to 500 cm^3 with distilled water. Cool, and filter if necessary to obtain a clear solution.

[C] 0.05 mol dm^{-3} aqueous silver nitrate.
Dissolve 8.5 g of $AgNO_3$ in each dm^3 of solution.

[T] 0.10 mol dm^{-3} acidified potassium dichromate(VI).
Dissolve 29.4 g of $K_2Cr_2O_7$ in distilled water, add 100 cm^3 of 1.0 mol dm^{-3} sulphuric acid and make up to 1 dm^3 with distilled water.

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

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 ma

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 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, MAY/JUNE 2006

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.