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

CHEMISTRY **9701/33**

Advanced Practical Skills **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.

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.

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. Please also see under 'Apparatus' on the use of pipette fillers, safety goggles and plastic gloves.

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	**N**	dangerous for the environment

The attention of Supervisors 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 Access to the question paper is NOT permitted in advance of the examination.

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.

3 Labelling of materials

Materials must be labelled as specified in these instructions. Materials with an **FA** code number should be so labelled **without** the identities being included on the label. Where appropriate the identity of an **FA** coded chemical is given in the question paper.

4 Identity of materials

It should be noted that descriptions of solutions given in the question paper may not correspond exactly with the specifications in these instructions. **The candidates must assume the descriptions given in the question paper.**

5 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.

Apparatus

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

2 Pipette fillers (or equivalent safety devices), safety goggles and disposable gloves should be used where necessary.

3 *For each candidate*

1 × glass rod
1 × 250 cm^3 beaker
2 × 250 cm^3 conical flask
1 × 50 cm^3 measuring cylinder
1 × 250 cm^3 graduated (volumetric) flask
3 × teat/squeeze/dropping pipette
1 × 50 cm^3 burette
1 × stand and burette clamp
1 × small funnel for filling burette
1 × 25 cm^3 bulb form pipette
1 × pipette filler
1 × small funnel
1 × white tile
1 × heat proof mat
1 × Bunsen burner
1 × tripod
1 × pipe-clay triangle
1 × crucible (at least 15 cm^3 capacity)
1 × pair of crucible tongs
1 × spatula
3 × boiling tube*
6 × test-tube*
1 × test-tube holder
1 × test-tube rack
1 × wash bottle containing distilled water
paper towels
access to a balance weighing to 0.1 g or better

* Candidates are expected to rinse and re-use test-tubes and boiling tubes where possible. Additional tubes should be available.

Where access to a balance is limited candidates should be directed to start the practical examination on different questions. (See p62 of the 2011 Syllabus for balance: candidate ratio).

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 Particular requirements

hazard	label	per candidate	identity	notes (hazards given in this column refer to the raw materials)
[H]	**FA 1**	5.80–5.90 g	ammonium iron(II) sulfate	5.80–5.90 g of $(NH_4)_2SO_4.FeSO_4.6H_2O$ **[H]** should be finely ground and provided in a stoppered tube.
[H]	**FA 2**	250 cm^3	1 mol dm^{-3} sulfuric acid	Cautiously pour 55 cm^3 of concentrated (98%) sulfuric acid **[C]** into 500 cm^3 of distilled water with continuous stirring. Make the solution up to 1 dm^3 with distilled water. ***Care:*** *Concentrated H_2SO_4 is very corrosive.*
[N]	**FA 3**	150 cm^3	0.010 mol dm^{-3} potassium manganate (VII)	Dissolve 1.58 g of $KMnO_4$ **[N] [O] [H]** in each dm^3 of distilled water.
	FA 4	1.5 g	9 parts $MgSO_4.7H_2O$ to 1 part anhydrous Na_2SO_4 by mass	a finely ground mixture of 9 parts by mass hydrated magnesium sulfate, $MgSO_4.7H_2O$, to 1 part by mass anhydrous sodium sulfate, Na_2SO_4
	FA 5	2.5 g	sodium hydrogencarbonate	finely ground $NaHCO_3$ provided in a stoppered tube
	FA 6	1.5 g	ammonium bromide	finely ground NH_4Br provided in a stoppered tube
[H]	**FA 7**	10 cm^3	1 mol dm^{-3} sulfuric acid	Cautiously pour 55 cm^3 of concentrated (98%) sulfuric acid **[C]** into 500 cm^3 of distilled water with continuous stirring. Make the solution up to 1 dm^3 with distilled water. ***Care:*** *Concentrated H_2SO_4 is very corrosive.*

NOTE: The laboratory must be well ventilated

3 The reagents below should also be provided. If necessary, they 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 lead to the contamination of reagents and enhance the opportunity for malpractice between candidates.

hazard	label	per candidate	notes (hazards given in this column refer to the raw materials)
[C]	**concentrated sulfuric acid**	1 cm^3	***Care:*** *Concentrated H_2SO_4 is very corrosive.*
[T] [N]	**0.1 mol dm^{-3} potassium chromate(VI)**	10 cm^3	Dissolve 19.4 g of K_2CrO_4 **[T] [N]** in each dm^3 of solution.
[H]	**dilute hydrochloric acid**	**See identity details and preparation instructions on page 65 and 66 of the 2011 syllabus**	
[C]	**dilute nitric acid**		
[H]	**dilute sulfuric acid**		
[H]	**aqueous ammonia**		
[C]	**aqueous sodium hydroxide**		
[T] **[H]**	**0.1 mol dm^{-3} barium chloride** **or** **0.1 mol dm^{-3} barium nitrate**		
[T] [N]	**0.1 mol dm^{-3} lead(II) nitrate**		
[H] [N]	**0.05 mol dm^{-3} silver nitrate**		
[H]	**limewater**		
[T] [N]	**acidifided aqueous potassium dichromate(VI)**		

4 The following materials and apparatus should be available.

red and blue litmus paper, plain filter paper strips for use with dichromate(VI), aluminium foil for testing for nitrate/nitrite, wooden splints and the apparatus normally used in the Centre for use with limewater in testing for carbon dioxide

Responsibilities of the Supervisor during the Examination

1 The Supervisor, or other competent chemist **must, out of sight of the candidates, carry out the experiment in Question 1 and Question 2** and complete tables 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.

2 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.

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.

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 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.

COLOUR-BLINDNESS

With regard to colour-blindness – a minor handicap, relatively common in males – it is permissible to advise candidates to 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.

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.

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** and **Question 2** 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 candidate 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 candidate 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 candidate numbers of the places occupied by the candidates for each experiment for each session, must be enclosed with the scripts.

[Turn over

Report on any difficulties experienced by candidates.