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Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

CHEMISTRY **9701/31**

Paper 3 Advanced Practical Skills 1 **October/November 2014**

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: info@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.

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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 and first-aid.

'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.

Supervisors are asked to carry out any confirmatory tests given on page 4 to ensure the materials supplied are appropriate.

If the concentrations differ slightly from those specified, the Examiners will make the necessary allowance. They should be informed of the exact concentrations.

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 itself.

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 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.

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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 × 250 cm^3 beaker
1 × 100 cm^3 beaker, labelled **waste**
1 × foamed plastic (polystyrene) cup
1 × 25 cm^3 measuring cylinder
1 × thermometer (–10 °C to +110 °C, at 1 °C)
1 × stop watch (sight of clock reading to 1 second)
1 × glass rod
1 × Bunsen burner
1 × heat proof mat
1 × test-tube holder
6 × test-tubes*
1 × hard-glass test-tube
3 × boiling tubes*
1 × test-tube rack
1 × spatula
1 × tripod and gauze
2 × teat/dropping pipettes
1 × wash bottle containing distilled water
paper towels
access to a balance weighing to at least 0.1 g

*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 p56 of the 2014 Syllabus for balance : candidate ratio.)

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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 are for the raw materials)
[H]	**FA 1**	40 cm^3	1.0 mol dm^{-3} sulfuric acid	See preparation instructions on page 59 of the 2014 syllabus.
[F]	**FA 2**	0.20 g	magnesium powder	0.20 ±0.02 g magnesium powder **[F]** per candidate in a stoppered tube. Note: **FA 4** and **FA 5** are also 0.20 ±0.02 g magnesium powder per candidate.
[H]	**FA 3**	70 cm^3	1.0 mol dm^{-3} copper(II) sulfate	Dissolve 249.6 g of $CuSO_4.5H_2O$ **[H][N]** in each dm^3 of solution.
[F]	**FA 4**	0.20 g	magnesium powder	0.20 ±0.02 g magnesium powder **[F]** per candidate in a stoppered tube.
[F]	**FA 5**	0.20 g	magnesium powder	0.20 ±0.02 g magnesium powder **[F]** per candidate in a stoppered tube.
[O][H]	**FA 6**	1 g	sodium nitrate	Approximately 1 g of $NaNO_3$ **[O][H]** should be provided for each candidate.
[H][N]	**FA 7**	10 cm^3	0.05 mol dm^{-3} silver nitrate	See identity details and preparation instructions on page 59 of the 2014 syllabus. Should be provided in a test-tube for each candidate and kept out the light until 1 hour before the examination.
	FA 8	1 g	zinc carbonate or basic zinc carbonate	Approximately 1 g of $ZnCO_3$ or $ZnCO_3.Zn(OH)_2$ should be provided for each candidate. Any basic zinc carbonate containing $ZnCO_3$ is suitable.
	glucose	1 g	glucose	Approximately 1 g of glucose should be provided for each candidate. Some suppliers will refer to this as D-Glucose or Dextrose.

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3 The reagents below should also be provided. Unless otherwise stated, each candidate should require no more than 10 cm^3 of any of these reagents. 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 contamination of reagents and enhance the opportunity for malpractice between candidates.

hazard	label	per candidate	identity	notes
[H]	**dilute hydrochloric acid**			
[C]	**dilute nitric acid**			
[H]	**dilute sulfuric acid**			
[H]	**aqueous ammonia**	25 cm^3		
[C]	**aqueous sodium hydroxide**	25 cm^3	See identity details and preparation instructions on pages 59 and 60 of the 2014 syllabus.	
[H]	**0.1 mol dm^{-3} barium chloride or 0.1 mol dm^{-3} barium nitrate**			
[H][N]	**0.05 mol dm^{-3} silver nitrate**			
[H]	**limewater**			
	0.1 mol dm^{-3} potassium iodide			
[H][N]	**acidified aqueous potassium manganate(VII)**	Mix equal volumes of 0.02 mol dm^{-3} $KMnO_4$ **[N]** and 1.0 mol dm^{-3} sulfuric acid **[H]**.		

4 The following materials and apparatus should be available.

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

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Responsibilities of the Supervisor during the Examination

1 The Supervisor, or other competent chemist, **must, out of sight of the candidates, carry out the experiments in Question 1** 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 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.

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.

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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 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.

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Report on any difficulties experienced by candidates.

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