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**CHEMISTRY**

**9701/33**

Paper 3 Advanced Practical Skills 1

**February/March 2017**

CONFIDENTIAL INSTRUCTIONS

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

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**The Supervisor's attention is drawn to the Supervisor's Report on page 7 which must be completed and returned with the scripts.**

If you have any queries regarding these Confidential Instructions, please contact Cambridge stating the Centre number, the nature of the query and the syllabus number quoted above.

email info@cie.org.uk  
phone +44 1223 553554  
fax +44 1223 553558

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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, suitable eye protection 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.

<b>C</b>	corrosive	<b>MH</b>	moderate hazard
<b>HH</b>	health hazard	<b>T</b>	acutely toxic
<b>F</b>	flammable	<b>O</b>	oxidising
<b>N</b>	hazardous to the aquatic 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 suppliers.

### 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 Confidential 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 materials given in the Question Paper may not correspond with the specifications in these Confidential 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.

### Apparatus

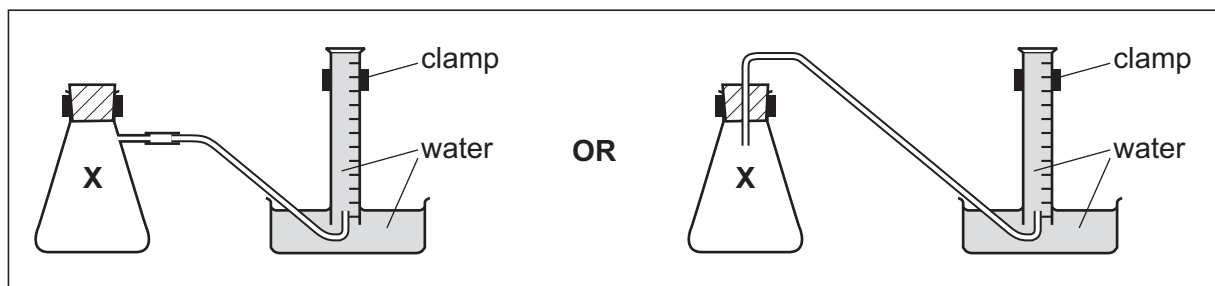
- 1 In addition to the fittings ordinarily contained in a chemical laboratory, the apparatus and materials specified below will be necessary.
- 2 Pipette fillers (or equivalent safety devices), suitable eye protection and disposable gloves should be used where necessary.
- 3 *For each candidate*
  - 1 × 250 cm<sup>3</sup> plastic or glass measuring cylinder
  - 1 × 50 cm<sup>3</sup> measuring cylinder
  - 2 × stand, clamp and boss
  - 1 × 250 cm<sup>3</sup> side-arm conical flask, labelled **X**, with bung and approximately 50 cm of plastic / rubber delivery tube to fit

**or**

  - 1 × 250 cm<sup>3</sup> conical flask, labelled **X**, with one-hole bung connected to approximately 50 cm of plastic / rubber delivery tube
  - 1 × tub suitable for acting as a trough (for collecting gas over water)
  - 1 × 50 cm<sup>3</sup> burette
  - 1 × burette stand and clamp
  - 1 × 25 cm<sup>3</sup> pipette
  - 1 × funnel (for filling burette)
  - 2 × 150 cm<sup>3</sup> or 250 cm<sup>3</sup> conical flask
  - 1 × 25 cm<sup>3</sup> measuring cylinder
  - 1 × white tile
  - 8 × test-tube\*
  - 4 × boiling tube\*
  - 1 × test-tube rack
  - 1 × test-tube holder
  - 2 × teat / dropping pipette
  - 1 × Bunsen burner
  - 1 × heatproof mat
  - 1 × wash bottle containing distilled water
  - 1 × pen (suitable for labelling glassware)
  - paper towels

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

These diagrams are to assist technicians in selecting apparatus but the apparatus is **not** to be set up for the candidates.



### 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 It should be noted that descriptions of substances given in the Question Paper may not correspond with the specifications in these Confidential Instructions.
- 3 Particular requirements

hazard	label	per candidate	identity	notes (hazards given in this column are for the raw materials)
	<b>FA 1</b>	280 cm <sup>3</sup>	'1 volume' hydrogen peroxide	Dilute 10.0 cm <sup>3</sup> of '100 volume' H <sub>2</sub> O <sub>2</sub> [ <b>C</b> ] to 1 dm <sup>3</sup> with distilled water. The solution can deteriorate so should be prepared as near as possible to when it is required or kept refrigerated.
[ <b>HH</b> ]	<b>FA 2</b>	2 g	manganese(IV) oxide	Provide approximately 2 g MnO <sub>2</sub> [ <b>HH</b> ] in a stoppered container.
	<b>FA 3</b>	180 cm <sup>3</sup>	0.0300 mol dm <sup>-3</sup> potassium manganate(VII)	Dissolve 4.74 g KMnO <sub>4</sub> [ <b>MH</b> ][ <b>N</b> ][ <b>O</b> ] in each dm <sup>3</sup> of 0.10 mol dm <sup>-3</sup> sulfuric acid.
[ <b>MH</b> ]	<b>FA 4</b>	120 cm <sup>3</sup>	1.0 mol dm <sup>-3</sup> sulfuric acid	See preparation instructions on page 56 of the current syllabus.
	<b>FA 5</b>	10 cm <sup>3</sup>	0.20 mol dm <sup>-3</sup> glucose	Dissolve 36.0 g C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> (D-glucose, dextrose) in each dm <sup>3</sup> of solution.
	<b>FA 6</b>	10 cm <sup>3</sup>	0.20 mol dm <sup>-3</sup> ammonium iron(II) sulfate	Dissolve 78.4 g (NH <sub>4</sub> ) <sub>2</sub> Fe(SO <sub>4</sub> ) <sub>2</sub> ·6H <sub>2</sub> O [ <b>MH</b> ] in each dm <sup>3</sup> of solution.
[ <b>MH</b> ][ <b>N</b> ]	<b>FA 7</b>	10 cm <sup>3</sup>	1.00 mol dm <sup>-3</sup> sodium nitrite	Dissolve 69.0 g NaNO <sub>2</sub> [ <b>N</b> ][ <b>O</b> ][ <b>T</b> ] in each dm <sup>3</sup> of solution.
	'10 vol' H <sub>2</sub> O <sub>2</sub>	10 cm <sup>3</sup>	'10 volume' hydrogen peroxide	Dilute 100.0 cm <sup>3</sup> of '100 volume' H <sub>2</sub> O <sub>2</sub> [ <b>C</b> ] to 1 dm <sup>3</sup> with distilled water. The solution can deteriorate so should be prepared as near as possible to when it is required or kept refrigerated.

**NOTE:** It is important that the laboratory is well ventilated as unpleasant fumes may be evolved.

- 4 The reagents below should also be provided. Unless otherwise stated, each candidate should require no more than 10 cm<sup>3</sup> 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	notes
	<b>dilute hydrochloric acid</b>	<b>See identity details and preparation instructions on pages 56 and 57 of the current syllabus.</b>
[C]	<b>dilute nitric acid</b>	
[MH]	<b>dilute sulfuric acid</b>	
[C][MH] [N]	<b>aqueous ammonia</b>	
[C]	<b>aqueous sodium hydroxide</b>	
	<b>0.1 mol dm<sup>-3</sup> barium chloride or 0.1 mol dm<sup>-3</sup> barium nitrate</b>	
[N]	<b>0.05 mol dm<sup>-3</sup> silver nitrate</b>	
[MH]	<b>limewater</b>	
[MH]	<b>acidified aqueous potassium manganate(VII)</b>	

- 5 The following materials and apparatus should be available.

red and blue litmus papers, 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

### 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 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 batch 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 Supervisor's Report on page 7 to show which candidates attended each session. If all candidates took the examination in one session, please indicate this on the Supervisor's Report. A copy of the Supervisor's Report 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 Results relevant to the candidates in 1.
- 3 A copy of the Supervisor's Report, 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.

### Supervisor's Report

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*

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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 preparation of materials;
- (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 Cambridge on the normal 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.

**Report on any difficulties experienced by candidates.**

**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) ..... (Supervisor)

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