

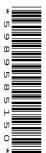
UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Advanced Subsidiary Level and Advanced Level

9701/32 **CHEMISTRY**

Paper 32 Practical Test May/June 2007

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 +44 1223 553554 by phone: +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.



[Turn over

by fax:

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 substanceO 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 pages 4 and 5 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 **FB** code number should be so labelled without the identities being included on the label. Where appropriate the identity of an **FB** 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.

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 plastic gloves should be used where necessary.
- 3 For each candidate
 - $2 \times 50 \, \text{cm}^3$ burettes
 - 2 × funnels for filling burettes
 - 2 × burette clamps
 - 2 × stands
 - 1 × 250 cm³ graduated (volumetric) flask, labelled **FB 3**
 - 1 × 250 cm³ conical flask
 - $2 \times 25 \, \text{cm}^3$ pipette
 - 1 × pipette filler
 - 1 × measuring cylinder to measure 10 cm³
 - 1 × white tile
 - 1 × wash bottle containing distilled water
 - 1 × plastic cup (preferably foamed plastic or expanded polystyrene) to hold at least 100 cm³
 - $1 \times 250 \,\mathrm{cm}^3$ beaker (to support the plastic cup)
 - 1 × weighing bottle to hold 15 g
 - 1×-10 °C to 110 °C by 1 °C thermometer

access to a balance weighing to 0.1 g or better

- 12 × test-tubes
- 1 × boiling-tube
- 1 × test-tube rack
- 1 × test-tube holder
- 2 × filter funnels (these may be the same as those used for filling burettes)
- 4 × filter papers
- 2 × teat/squeeze pipettes

paper towels

Chemicals Required

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.)
E	FB 1	100 cm ³	0.41 mol dm ⁻³ ammonium iron(II) sulphate	Dissolve 160.0g of $(NH_4)_2SO_4$. $FeSO_4$. $6H_2O$ in 250 cm ³ of 1.0 mol dm ⁻³ H_2SO_4 [H] , then make the solution up to 1 dm ³ with distilled water.
[H]	FB 2	150 cm ³	0.0120 mol dm ⁻³ potassium manganate(VII)	Dissolve 1.90g of KMnO ₄ [O] [H] in each dm 3 of solution.
Ξ	1 mol dm ⁻³ H ₂ SO ₄	100 cm ³		Cautiously pour 55 cm ³ of concentrated (98%) sulphuric 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 ₂ SO ₄ is very corrosive.
Check	Check on the concentrations of FB 1 and FB 2	ations of F	FB 1 and FB 2	
Use a p	Use a pipette or measuring cylinder to first permanent pink colour is obtained	ng cylinder ur is obtair	r to place $5cm^3$ of FB 1 in a conic ned.	Use a pipette or measuring cylinder to place 5cm³ of FB 1 in a conical flask. Add 10cm³ of 1 moldm⁻³ sulphuric acid and titrate with FB 2 until the first permanent pink colour is obtained.
Adjust	the concentration	of either so	ion to obtain a titre in	the range $33-35$ cm ³ .
Ξ	FB 4	120 cm ³	0.8 mol dm ⁻³ citric acid	Dissolve 168 g of 2-hydroxypropane-1,2,3-tricarboxylic acid-1-water (citric acid) [H] in each dm ³ of solution.
	FB 5	25g	solid sodium hydrogencarbonate, NaHCO ₃	
[C]	FB 6	20 cm ³	0.1 mol dm ⁻³ iron(III) chloride	Dissolve 27.0g of FeCl ₃ .6H ₂ O [C] in each dm ³ of solution. Use laboratory grade or better, not technical grade.
Ξ	FB 7	20 cm ³	contains chromium chloride and sodium (or potassium) iodide	Dissolve 10.0g of CrCl ₃ .6H ₂ O [T] [H] and 15.0g of NaI in each dm ³ of solution. 17.0g of potassium iodide, KI, can be used in place of sodium iodide.
N E	FB 8	20 cm ³	0.1 mol dm ⁻³ cobalt(II) sulphate	Dissolve $28.0g$ of $CoSO_4$.7 H_2O [T] [N] in each dm ³ of solution.
Е	0.1 mol dm ⁻³ barium	10 cm ³	0.1 mol dm ⁻³ barium chloride	Dissolve 24.4g of $BaCl_{2}$.2 $H_{2}O$ [T] in each dm ³ of solution.
Ε	[or barium nitrate]	5	[or 0.1 mol dm ⁻³ barium nitrate]	[Or dissolve 26.1 g of Ba(NO ₃) ₂ [T] [O] in each dm ³ of solution.]
[C] [N]	0.05 mol dm ⁻³ silver nitrate	10 cm ³	0.05 mol dm ⁻³ silver nitrate	Dissolve 8.5g of AgNO $_3$ [C] [N] in each dm 3 of solution.

the attention of the Invigilators should be drawn to the fact that such an arrangement may enhance the opportunity for malpractice between The standard bench reagents specifically required are set out below. If necessary, they may be made available from a communal supply: however, candidates.

hazard	label	identity	notes
			(Hazard symbols refer to the raw materials.)
<u></u>	dilute nitric acid	dilute nitric acid 2.0 mol dm ⁻³ HNO ₃	Dilute 128 cm ³ of concentrated (70% w/w) acid [C] [O] to 1 dm ³ .
Έ	dilute hydrochloric 2.0 mol dm ⁻³ HCl	2.0 mol dm ⁻³ HC <i>l</i>	Dilute 172 cm ³ of concentrated (35% w/w; approximately 11 mol dm ⁻³) acid [C]
	acid		to 1 dm ³ .
<u>5</u>	돌	2.0 mol dm ⁻³ NaOH	Dissolve 80.0g of NaOH [C] in each dm ³ of solution.
	hydroxide		Care – the process of solution is exothermic and any concentrated solution is
			very corrosive.
[H]	aqueous ammonia $2.0 \text{ mol dm}^{-3} \text{ NH}_3$	$2.0 \text{ mol dm}^{-3} \text{ NH}_3$	Dilute 112 dm ³ of concentrated (35% w/w) ammonia [C] [N] to 1 dm ³ .

The reagents, materials and apparatus to test the gases listed in the syllabus must be available to candidates. 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 enhance the opportunity for malpractice between candidates.

hazard	label	identity	notes
[H]	limewater	saturated aqueous calcium hydroxide, Ca(OH) ₂	Prepare fresh limewater by leaving distilled water to stand over solid calcium hydroxide [H] for several days, shaking occasionally. Decant or filter the solution.
[N]	aqueous potassium 0.1 mol dm ⁻³ K ₂ Cr ₂ O ₇ dichromate(VI)	0.1 mol dm ⁻³ K ₂ Cr ₂ O ₇	Dissolve 29.5 g of K ₂ Cr ₂ O ₇ [T] [N] in each dm ³ of solution which should contain about 10% dilute sulphuric acid [H] . The use of plastic gloves may be considered to prevent contact with skin.
		red and blue litmus paper	
		plain filter paper strips for use with dichromate	
		wooden splints	
		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 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 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 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.

REPORT FORM

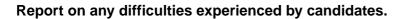
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This form must be com	pleted and sent to th	e Examiner in the envelopment	ppe with the scripts.

Cer	tre Number	Name of Centre
1	Supervisor's Results	
		d in Question 1 and Question 2 on a spare copy of or's Results' and showing the Centre number and
2	The index numbers of candidates attending ea	ach session were:
	First Session	Second Session
3	The Supervisor is required to give details o candidates, giving names and index numbers	verleaf of any difficulties experienced by particular. These should include reference to:
	(a) any general difficulties encountered in ma	aking preparation;
	(b) difficulties due to faulty apparatus or mate	erials;
	(c) accidents with apparatus or materials;	
	(d) assistance with respect to colour-blindne	SS.

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

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.



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