
CHEMISTRY (PRINCIPAL)

9791/04

Paper 4 Practical

May/June 2019

CONFIDENTIAL INSTRUCTIONS



This document gives details of how to prepare for and administer the practical exam.

The information in this document and the identity of any materials supplied by Cambridge International are confidential and must NOT reach candidates either directly or indirectly.

The supervisor must complete the report at the end of this document and return it with the scripts.

If you have any queries regarding these confidential instructions, contact Cambridge International stating the centre number, the syllabus and component number and the nature of the query.

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This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 3 Pre-U Certificate.

This document consists of **7** printed pages and **1** blank page.

General information about practical exams

Centres must follow the guidance on science practical exams given in the *Cambridge Handbook*.

Safety

Supervisors must follow national and local regulations relating to safety and first aid.

Only those procedures described in the question paper should be attempted.

Supervisors must inform candidates that materials and apparatus used in the exam should be treated with caution. Suitable eye protection should be used where necessary.

The following hazard codes are used in these confidential instructions, where relevant:

C	corrosive	MH	moderate hazard
HH	health hazard	T	acutely toxic
F	flammable	O	oxidising
N	hazardous to the aquatic environment		

Hazard data sheets relating to substances used in this exam should be available from your chemical supplier.

Before the exam

- The packets containing the question papers must **not** be opened before the exam.
- It is assumed that standard school laboratory facilities, as indicated in the *Guide to Planning Practical Science*, will be available.
- Spare materials and apparatus for the tasks set must be available for candidates, if required.

During the exam

- It must be made clear to candidates at the start of the exam that they may request spare materials and apparatus for the tasks set.
- Where specified, the supervisor **must** perform the experiments and record the results as instructed. This must be done **out of sight** of the candidates, using the same materials and apparatus as the candidates.
- Any assistance provided to candidates must be recorded in the supervisor's report.
- If any materials or apparatus need to be replaced, for example, in the event of breakage or loss, this must be recorded in the supervisor's report.

After the exam

- The supervisor must complete a report for each practical session held and each laboratory used.
- Each packet of scripts returned to Cambridge International must contain the following items:
 - the scripts of the candidates specified on the bar code label provided
 - the supervisor's results relevant to these candidates
 - the supervisor's reports relevant to these candidates
 - seating plans for each practical session, referring to each candidate by candidate number
 - the attendance register.

Specific information for this practical exam

During the exam, the supervisor (NOT the invigilator) must do all the experiments and record the results on a spare copy of the question paper, clearly labelled “supervisor’s results”.

If chemicals are prepared in more than one batch, clearly labelled supervisor’s results must be provided for each batch. The candidates using each batch must be listed on the supervisor’s report.

Apparatus

The apparatus listed must be provided to each candidate.

- 1 × 50 cm³ burette
- 1 × burette clamp and stand
- 1 × small funnel for filling burette
- 1 × small funnel for filling volumetric flask
- 1 × 25 cm³ pipette
- 1 × pipette filler
- 1 × conical flask within range 150 to 250 cm³
- 1 × 50 cm³ measuring cylinder
- 1 × 250 cm³ beaker
- 1 × 100 cm³ beaker
- 1 × 250 cm³ volumetric (graduated) flask and stopper
- 1 × glass rod
- 1 × white tile
- 1 × spatula
- 1 × heat-proof mat
- 1 × Bunsen burner
- 1 × tripod
- 1 × pipeclay triangle
- 1 × crucible (at least 15 cm³ capacity) with lid
- 1 × pair of tongs
- 12 × test-tubes
- 1 × test-tube holder
- 1 × test-tube rack
- a supply of dropping pipettes
- 1 × pen (suitable for marking glassware)
- 1 × wash bottle of distilled water
- paper towels
- red and blue litmus papers
- aluminium foil for testing nitrate/nitrite
- wooden splints
- apparatus normally used in the centre in testing for carbon dioxide with limewater

access to balance, single-pan, direct reading, minimum accuracy 0.1 g (1 per 8–12 candidates), weighing to 300 g

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

Materials

The materials listed in the table must be provided to each candidate.

label	per candidate	identity	notes
[MH] FA 1	2.0g	1.0g of potassium carbonate + 1.0g of potassium sulfate	Mix 1.0g of K_2CO_3 [MH] and 1.0g of K_2SO_4 in a weighing bottle.
FA 2	300cm ³	0.10 mol dm ⁻³ hydrochloric acid	Dilute 2.0 mol dm ⁻³ HCl twenty-fold. For preparation of 2.0 mol dm ⁻³ HCl, see the current syllabus.
FA 3	150cm ³	0.040 mol dm ⁻³ sodium hydroxide	Dilute 0.40 mol dm ⁻³ NaOH [MH] ten-fold. To prepare 0.40 mol dm ⁻³ NaOH [MH], dissolve 16.0g of NaOH [C] in each dm ³ of solution.
[T] [C] [N] [F] [MH] [HH]	10cm ³	methyl orange indicator	See preparation instructions in the current syllabus.
FA 5	1.5g	hydrated magnesium sulfate	Supply finely ground $MgSO_4 \cdot 7H_2O$ in a weighing bottle.
*[MH] [C] FA 6	30cm ³	2.0 mol dm ⁻³ sodium hydroxide	See preparation instructions in the current syllabus.
*[MH] [C] FA 7	30cm ³	1.0 mol dm ⁻³ sodium carbonate	See preparation instructions in the current syllabus.
*[MH] [C] FA 8	30cm ³	0.2 mol dm ⁻³ ammonium iron(III) sulfate in 0.1 mol dm ⁻³ sulfuric acid	Dissolve 96.4g of $NH_4Fe(SO_4)_2 \cdot 12H_2O$ [MH] in each dm ³ of 0.1 mol dm ⁻³ sulfuric acid. Prepare 0.1 mol dm ⁻³ sulfuric acid by 10-fold dilution of 1.0 mol dm ⁻³ sulfuric acid [MH]. For preparation of 1.0 mol dm ⁻³ sulfuric acid [MH], see the current syllabus.
*[MH] [C] FA 9	30cm ³	0.2 mol dm ⁻³ zinc chloride	Dissolve 27.3g of $ZnCl_2$ [C] [MH] [N] in each dm ³ of solution.

* To avoid the hazard labels assisting towards the identification of these solutions, all of these solutions should be labelled [MH] [C].

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	<p>See preparation instructions in the current syllabus.</p> <p>If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates.</p> <p>Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.</p>
[MH] dilute sulfuric acid	10 cm ³	1.0 mol dm ⁻³ H ₂ SO ₄	
[C] aqueous ammonia	10 cm ³	2.0 mol dm ⁻³ NH ₃	
[C] aqueous sodium hydroxide	10 cm ³	2.0 mol dm ⁻³ NaOH	
aqueous barium chloride or aqueous barium nitrate	10 cm ³	0.1 mol dm ⁻³ BaCl ₂ or 0.1 mol dm ⁻³ Ba(NO ₃) ₂	
aqueous silver nitrate	10 cm ³	0.05 mol dm ⁻³ AgNO ₃	
[MH] limewater	10 cm ³	saturated aqueous calcium hydroxide, Ca(OH) ₂	

- An excess of at least 10% of each material must be prepared to cover accidental loss.
- All solutions must be thoroughly mixed.
- If you are unable to source any of these chemicals, you must contact Cambridge International as far as possible in advance of the exam for advice.
- **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FA 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper.**

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Supervisor's report

Syllabus and component number

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Centre number

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Centre name

Time of the practical session

Laboratory name/number

Give details of any difficulties experienced by the centre or by candidates (include the relevant candidate names and candidate numbers).

You must include:

- any difficulties experienced by the centre in the preparation of materials
- any difficulties experienced by candidates, e.g. due to faulty materials or apparatus
- any specific assistance given to candidates.

If chemicals have been prepared in more than one batch, list the candidates using each batch.

Declaration

- 1 Each packet that I am returning to Cambridge International contains the following items:
 - the scripts of the candidates specified on the bar code label provided
 - the supervisor's results relevant to these candidates
 - the supervisor's reports relevant to these candidates
 - seating plans for each practical session, referring to each candidate by candidate number
 - the attendance register
- 2 Where the practical exam has taken place in more than one practical session, I have clearly labelled the supervisor's results, supervisor's reports and seating plans with the time and laboratory name/number for each practical session.
- 3 I have included details of difficulties relating to each practical session experienced by the centre or by candidates.
- 4 I have reported any other adverse circumstances affecting candidates, e.g. illness, bereavement or temporary injury, directly to Cambridge International on a *special consideration form*.

Signed (supervisor)

Name (in block capitals)