



Cambridge Pre-U

CHEMISTRY

9791/04

Paper 4 Practical

May/June 2023

CONFIDENTIAL INSTRUCTIONS

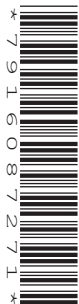
This document gives details of how to prepare for and administer the practical exam.

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.

INSTRUCTIONS

- 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.
email info@cambridgeinternational.org
phone +44 1223 553554



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

This document has **8** pages. Any blank pages are indicated.

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 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.

- 2 × 50 cm³ burettes
- 1 × 25 cm³ pipette
- 1 × pipette filler
- 2 × stand and burette clamps
- 2 × funnels for filling burette
- 2 × 150 cm³ or 250 cm³ conical flasks
- 1 × white tile
- 1 × 100 cm³ beaker
- 1 × 250 cm³ beaker
- 1 × 25 cm³ measuring cylinder
- 1 × 250 cm³ volumetric (graduated) flask and stopper
- 1 × foamed plastic (expanded polystyrene) cup
- 1 × thermometer, -10 °C to +50 °C at 0.5 °C intervals
- 1 × glass rod
- 15 × test-tubes*
- 1 × test-tube rack
- 2 × teat/dropping pipettes
- wash bottle containing distilled water
- pen for labelling glassware
- paper towels
- red and blue litmus papers
- aluminium foil for testing nitrate/nitrite
- wooden splints
- the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

Materials

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

N.B. Small amounts of NO₂ [C] [O] [T], which can cause respiratory distress in some people, may be produced. **The laboratory must be well ventilated.**

| label | per candidate | identity | notes |
|---|---------------------|--|--|
| FA 1 | 70 cm ³ | mixture containing 1.2 mol dm ⁻³ hydrochloric acid and 0.8 mol dm ⁻³ ethanoic acid | Dilute 100 cm ³ of concentrated (35–37%; approximately 11.7 mol dm ⁻³) hydrochloric acid [C] [MH] and 46 cm ³ of ethanoic acid (glacial acetic acid; 17.4 mol dm ⁻³) [C] [F] to 1 dm ³ . |
| FA 2 | 200 cm ³ | 0.100 mol dm ⁻³ sodium hydroxide | 10-fold dilution of 1.00 mol dm ⁻³ NaOH. For 1.00 mol dm ⁻³ NaOH dissolve 40.0 g of NaOH [C] in each dm ³ of solution. Care: the process of solution is exothermic and any concentrated solution is very corrosive. Solutions of 0.100 mol dm ⁻³ NaOH should be freshly made. |
| FA 4 [C] | 30 cm ³ | 2.0 mol dm ⁻³ sodium hydroxide | See preparation instructions in the current syllabus. |
| FA 5 [MH] [N] | 15 cm ³ | 1.0 mol dm ⁻³ sodium nitrate(III) / sodium nitrite | Dissolve 70.0 g of NaNO ₂ [O] [N] [T] in each dm ³ of solution. |
| FA 6 [MH] | 15 cm ³ | 0.2 mol dm ⁻³ iron(II) sulfate | Dissolve 55.6 g of FeSO ₄ ·7H ₂ O [MH] in each dm ³ of solution. This solution must be freshly prepared or it can be made up earlier, and will resist oxidation, if 0.1 mol dm ⁻³ sulfuric acid [MH] is used instead. |
| FA 7 [MH] | 15 cm ³ | 1.0 mol dm ⁻³ sodium carbonate | See preparation instructions in the current syllabus. |
| FA 8 | 25 cm ³ | 0.1 mol dm ⁻³ barium chloride | See preparation instructions in the current syllabus. (Barium nitrate is not suitable.) |
| FA 9 | 10 cm ³ | 0.25 mol dm ⁻³ aluminium chloride | Dissolve 60.4 g of AlCl ₃ ·6H ₂ O [MH] in each dm ³ of solution. |
| FA 10 [C] [N] | 10 cm ³ | 0.2 mol dm ⁻³ zinc chloride | Dissolve 27.3 g of ZnCl ₂ [C] [MH] [N] in each dm ³ of solution. Hydrogen chloride gas [C] [T] is produced when anhydrous zinc chloride is added to water. Use a fume cupboard. |
| bromocresol green indicator [F] [MH] [HH] | 10 cm ³ | bromocresol green indicator | Dissolve 0.4 g of indicator in 200 cm ³ of ethanol (IMS) [F] [MH] [HH] and make up to 1 dm ³ with distilled water. |

| label | per candidate | identity | notes |
|---|---------------------|--|---|
| distilled water | 300 cm ³ | distilled water | |
| dilute hydrochloric acid | 10 cm ³ | 2.0 mol dm ⁻³ HCl | |
| dilute nitric acid [C] | 10 cm ³ | 2.0 mol dm ⁻³ HNO ₃ | |
| dilute sulfuric acid [MH] | 10 cm ³ | 1.0 mol dm ⁻³ H ₂ SO ₄ | |
| aqueous ammonia [C] [MH] [N] | 20 cm ³ | 2.0 mol dm ⁻³ NH ₃ | |
| aqueous sodium hydroxide [C] | 20 cm ³ | 2.0 mol dm ⁻³ NaOH | See preparation instructions in the current syllabus. |
| 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 | If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. |
| aqueous sodium carbonate [MH] | 10 cm ³ | 1.0 mol dm ⁻³ Na ₂ CO ₃ | Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply. |
| limewater [MH] | 10 cm ³ | saturated aqueous calcium hydroxide, Ca(OH) ₂ | |
| aqueous silver nitrate | 10 cm ³ | 0.05 mol dm ⁻³ AgNO ₃ | |
| acidified aqueous potassium manganate(VII) [MH] | 10 cm ³ | 0.01 mol dm ⁻³ KMnO ₄ in 0.5 mol dm ⁻³ H ₂ SO ₄ | |

- An excess of at least 10% of each material must be prepared to cover accidental loss.
- All solutions should 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.
- **Material 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 all of 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)