



Cambridge International AS & A Level

CHEMISTRY

9701/31

Paper 3 Advanced Practical Skills 1

May/June 2025

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 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 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 × 25 cm³ pipette
 1 × pipette filler
 1 × 50 cm³ burette
 2 × 150 cm³ or 250 cm³ conical flask
 1 × 50 cm³ measuring cylinder
 1 × 250 cm³ plastic or glass measuring cylinder
 1 × burette stand and clamp
 1 × 250 cm³ one-mark graduated volumetric flask (ISO1042 or grade B)
 1 × 100 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 2 × stand and clamp
 1 × tub suitable for acting as trough (minimum capacity 1 dm³)
 1 × side-arm conical flask, labelled **X**, with bung connected to approximately 50 cm of plastic/rubber delivery tube **OR** additional 150 cm³ or 250 cm³ conical flask, labelled **X**, with one-hole bung connected to approximately 50 cm of plastic/rubber delivery tube. **The Supervisor and all the candidates should use the same size conical flask.**
 1 × glass rod
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × boiling tube
 1 × hard-glass test-tube
 6 × test-tube*
 1 × test-tube rack
 balance, single-pan, direct reading, minimum accuracy 0.01 g (1 per 8–12 candidates) weighing to 200 g
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 paper towels
 red and blue litmus papers
 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

Materials

The materials listed in the table must be provided to each candidate. **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. For example, candidates may be supplied with sulfuric acid, labelled as FA 1, but be told in the question paper that FA 1 is phosphoric acid.**

label	per candidate	identity	notes
FA 1	0.7 g	calcium carbonate	Provide 0.70 ± 0.1 g powdered CaCO_3 in a stoppered container.
FA 2	70 cm^3	$0.500 \text{ mol dm}^{-3}$ hydrochloric acid	Dilute 250 cm^3 of $2.0 \text{ mol dm}^{-3} \text{ HCl}$ in each dm^3 of solution. For $2.0 \text{ mol dm}^{-3} \text{ HCl}$, see preparation instructions in the current syllabus.
FA 3	40 cm^3	$0.500 \text{ mol dm}^{-3}$ hydrochloric acid	Same as FA 2 .
FA 5	100 cm^3	$0.0600 \text{ mol dm}^{-3}$ sodium hydroxide	Dissolve 2.4 g of NaOH [C] in each dm^3 of solution. A different concentration is given in the question paper.
FA 6 [F][MH][HH]	5 cm^3	bromophenol blue indicator	See preparation instructions in the current syllabus.
FA 7	20 cm^3	solution of copper(II) chloride and ammonium chloride	Dissolve 10.0 g $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ [MH][N] and 6.0 g NH_4Cl [MH] in each dm^3 of solution.
FA 8	1.0 g	sodium hydrogencarbonate	Provide $1.0 \pm 0.1 \text{ g}$ NaHCO_3 in a stoppered container.
FA 9 [MH]	1.0 g	anhydrous sodium carbonate	Provide $1.0 \pm 0.1 \text{ g}$ Na_2CO_3 [MH] in a stoppered container.
distilled water	250 cm^3	distilled water	
aqueous potassium iodide	5 cm^3	0.1 mol dm^{-3} potassium iodide	Dissolve 16.6 g KI in each dm^3 of solution.
starch solution	5 cm^3	freshly prepared aqueous starch solution (approx 2% solution w/v)	See preparation instructions in the current syllabus.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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]	10 cm ³	2.0 mol dm ⁻³ NH ₃	
aqueous sodium hydroxide [C]	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	
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 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.

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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:
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Signed (supervisor)

Name (in block capitals)



Cambridge International AS & A Level

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Paper 3 Advanced Practical Skills 2

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 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 2 × plastic or cardboard cup, capacity approximately 150 cm³
 1 × glass rod
 2 × teat/dropping pipette
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 1 × heat-proof mat
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 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

Where balance provision is limited, some candidates should be instructed to start the exam with different questions.

Materials

The materials listed in the table must be provided to each candidate. **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FB 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper. For example, candidates may be supplied with sulfuric acid, labelled as FB 1, but be told in the question paper that FB 1 is phosphoric acid.**

label	per candidate	identity	notes
FB 1	120 cm ³	0.0391 mol dm ⁻³ citric acid	Dissolve 7.50 g of anhydrous C ₆ H ₈ O ₇ [MH] in each dm ³ of solution.
FB 2	120 cm ³	0.113 mol dm ⁻³ sodium hydroxide	Dissolve 4.50 g of NaOH [C] in each dm ³ of solution.
FB 3 [F][MH][HH]	10 cm ³	thymolphthalein indicator	See preparation instructions in the current syllabus.
FB 4 [MH]	12.0 g	citric acid	Provide 12.0 ± 0.2 g of anhydrous C ₆ H ₈ O ₇ [MH] in a stoppered container.
FB 5 [MH]	5.5 g	citric acid	Provide 5.5 ± 0.1 g of anhydrous C ₆ H ₈ O ₇ [MH] in a stoppered container.
FB 6 [C]	60 cm ³	2.00 mol dm ⁻³ sodium hydroxide	Dissolve 80.0 g of NaOH [C] in each dm ³ of solution.
FB 7 [C]	20 cm ³	0.20 mol dm ⁻³ copper(II) nitrate	Dissolve 37.5 g of Cu(NO ₃) ₂ [C][MH][N] in each dm ³ of solution. Alternatively, use any hydrated form of copper(II) nitrate. If using Cu(NO ₃) ₂ •3H ₂ O [C][MH][N] , dissolve 48.3 g in each dm ³ of solution.
FB 8 [MH]	20 cm ³	0.10 mol dm ⁻³ iron(III) chloride	Dissolve 27.0 g of FeCl ₃ •6H ₂ O [MH][C] in 250 cm ³ of 2.0 mol dm ⁻³ HCl, then make up to 1 dm ³ with distilled water. For 2.0 mol dm ⁻³ HCl, see preparation instructions in current syllabus.
zinc [F][N]	1.0 g	zinc	Provide 1.0 ± 0.1 g of zinc powder [F][N] in a stoppered container.
potassium iodide	5 cm ³	0.50 mol dm ⁻³ potassium iodide	Dissolve 83.0 g of KI in each dm ³ of solution.
sodium thiosulfate	20 cm ³	0.20 mol dm ⁻³ sodium thiosulfate	Dissolve 49.6 g of Na ₂ S ₂ O ₃ •5H ₂ O in each dm ³ of solution.
distilled water	50 cm ³	distilled water	

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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limewater [MH]	10 cm ³	saturated aqueous calcium hydroxide, Ca(OH) ₂	
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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

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 1 × 25 cm³ measuring cylinder
 1 × 50 cm³ measuring cylinder
 1 × burette stand and clamp
 1 × 250 cm³ one-mark graduated volumetric flask (ISO1042 or grade B)
 1 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 2 × plastic or cardboard cup, capacity approximately 150 cm³
 1 × glass rod
 1 × stop-clock to measure to an accuracy of 1 second
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 3 × boiling tube
 8 × test-tube*
 1 × test-tube rack
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 1 × funnel (for filtering)
 2 × filter paper
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 red and blue litmus papers
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label	per candidate	identity	notes
FA 1	110 cm ³	9 vol hydrogen peroxide	Dilute 90 cm ³ of freshly opened 100 vol H ₂ O ₂ [C] or dilute 450 cm ³ of freshly opened 20 vol H ₂ O ₂ [MH] to 1.0 dm ³ with distilled water.
FA 2	120 cm ³	0.0300 mol dm ⁻³ potassium manganate(VII)	Dissolve 4.74 g of KMnO ₄ [N][O][MH][HH] in each dm ³ of solution.
FA 3 [MH]	50 cm ³	1.0 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FA 5 [MH]	2.5 g	manganese(IV) oxide, MnO ₂	Provide 2.5 ± 0.1 g of powdered MnO ₂ [MH] in a stoppered container.
FA 6 [MH]	10 cm ³	0.10 mol dm ⁻³ iron(III) chloride	Dissolve 16.2 g FeCl ₃ [MH][C] or 27.0 g of FeCl ₃ •6H ₂ O [MH][C] in 500 cm ³ of 2.0 mol dm ⁻³ HCl and dilute the solution to 1 dm ³ . For 2.0 mol dm ⁻³ HCl, see preparation instructions in the current syllabus.
FA 7	10 cm ³	0.5 mol dm ⁻³ potassium iodide	Dissolve 83.0 g of KI in each dm ³ of solution.
distilled water	250 cm ³	distilled water	
iron(II) sulfate	5 cm ³	0.2 mol dm ⁻³ iron(II) sulfate	Dissolve 30.3 g of FeSO ₄ [MH] or 55.6 g of FeSO ₄ •7H ₂ O [MH] in 100 cm ³ of 1.00 mol dm ⁻³ sulfuric acid [MH] and make up to 1.0 dm ³ with distilled water.
starch solution	5 cm ³	starch solution	See preparation instructions in the current syllabus.
aqueous sodium carbonate	5 cm ³	0.5 mol dm ⁻³ sodium carbonate	Dissolve 53.0 g of Na ₂ CO ₃ [MH] or 143.0 g of Na ₂ CO ₃ •10H ₂ O [MH] in each dm ³ of solution.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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If chemicals have been prepared in more than one batch, list the candidates using each batch.

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Signed (supervisor)

Name (in block capitals)



Cambridge International AS & A Level

CHEMISTRY

9701/34

Paper 3 Advanced Practical Skills 2

May/June 2025

CONFIDENTIAL INSTRUCTIONS

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INSTRUCTIONS

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email info@cambridgeinternational.org
phone +44 1223 553554

This document has 8 pages.

General information about practical exams

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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.
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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.
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- Any assistance provided to candidates must be recorded in the supervisor's report.
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 1 × 25 cm³ measuring cylinder
 2 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 1 × plastic or cardboard cup, capacity approximately 150 cm³
 1 × glass rod
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × boiling tube
 8 × test-tube*
 1 × test-tube rack
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 paper towels
 red and blue litmus papers
 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

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The materials listed in the table must be provided to each candidate. **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FB 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper. For example, candidates may be supplied with sulfuric acid, labelled as FB 1, but be told in the question paper that FB 1 is phosphoric acid.**

label	per candidate	identity	notes
FB 1	120 cm ³	0.0500 mol dm ⁻³ iron(II) sulfate with dilute sulfuric acid	Dissolve 13.89 ± 0.02 g of FeSO ₄ •7H ₂ O [MH] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water. Provide in a stoppered container. This solution should be prepared as near to the time of the exam as possible.
FB 2	120 cm ³	0.0100 mol dm ⁻³ potassium manganate(VII) with dilute sulfuric acid	Dissolve 1.58 ± 0.02 g of KMnO ₄ [O][MH][HH][N] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water.
FB 3 [MH]	50 cm ³	1.00 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FB 4 [C]	100 cm ³	1.00 mol dm ⁻³ sodium hydroxide	See preparation instructions in the current syllabus.
FB 5	60 cm ³	2.00 mol dm ⁻³ hydrochloric acid	See preparation instructions in the current syllabus.
FB 6 [MH]	10 cm ³	2.00 mol dm ⁻³ ethanoic acid	Use 120 g of glacial ethanoic acid [C][F] diluted to 1.0 dm ³ . Supply in a stoppered container.
FB 7 [C]	10 cm ³	1.00 mol dm ⁻³ sodium hydroxide	Same solution as FB 4 .
FB 8	10 cm ³	10 vol hydrogen peroxide	Dilute 100 cm ³ of 100 vol H ₂ O ₂ [C] in each dm ³ of solution or dilute 500 cm ³ of 20 vol H ₂ O ₂ [MH] in each dm ³ of solution. Supply in a stoppered container.
FB 9 [MH]	1 g	0.5 g of anhydrous sodium carbonate + 0.5 g of ammonium bromide	Mix together 0.5 ± 0.1 g of Na ₂ CO ₃ [MH] and 0.5 ± 0.1 g of NH ₄ Br [MH] . Alternatively use 0.5 g of (NH ₄) ₂ CO ₃ [MH] mixed with 0.5 g of KBr. Provide in a stoppered container.
iron(II) sulfate	10 cm ³	0.2 mol dm ⁻³ iron(II) sulfate with dilute sulfuric acid	Dissolve 55.6 g of FeSO ₄ •7H ₂ O [MH] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water. Provide in a stoppered container. This solution should be prepared as near to the time of the exam as possible.

label	per candidate	identity	notes
manganese(IV) oxide [MH]	0.5 g	solid manganese(IV) oxide	Provide 0.5 g $\pm$ 0.1 g of powdered MnO ₂ [MH] in a stoppered container.
magnesium [F]	2 $\times$ 1 cm length	magnesium ribbon	Provide two pieces of magnesium ribbon [F] each 1 cm length. The ribbon should be lightly sanded before cutting. Plenty of spare strips should be available in reserve.
aqueous chlorine [C][N]	5 cm ³	aqueous sodium chlorate(I)	Prepare by diluting domestic / commercial bleach [C][N] with an equal volume of water. Check the concentration is suitable by ensuring the solution decolourises litmus paper. May be supplied as sodium hypochlorite. Provide in a stoppered container.
distilled water	50 cm ³	distilled water	

The list of materials continues on the next page.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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]	10 cm ³	2.0 mol dm ⁻³ NH ₃	
aqueous sodium hydroxide [C]	20 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	
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 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.

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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

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Signed (supervisor)

Name (in block capitals)



Cambridge International AS & A Level

CHEMISTRY

9701/35

Paper 3 Advanced Practical Skills 1

May/June 2025

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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
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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

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During the exam

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After the exam

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Apparatus

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 1 × pipette filler
 1 × 50 cm³ burette
 2 × 150 cm³ or 250 cm³ conical flask
 1 × 50 cm³ measuring cylinder
 1 × 250 cm³ plastic or glass measuring cylinder
 1 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 2 × stand and clamp
 1 × tub suitable for acting as trough (minimum capacity 1 dm³)
 1 × 150 cm³ or 250 cm³ side-arm conical flask, labelled **X**, with bung connected to approximately 50 cm of plastic/rubber delivery tube **OR** additional 1 × 150 cm³ or 250 cm³ conical flask, labelled **X**, with one-hole bung connected to approximately 50 cm of plastic/rubber delivery tube. **The Supervisor and all the candidates should use the same size conical flask.**
 1 × glass rod
 2 × teat/dropping pipette
 1 × spatula
 1 × tripod
 1 × gauze
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 8 × test-tube*
 1 × test-tube rack
 balance, single-pan, direct reading, minimum accuracy 0.01 g (1 per 8–12 candidates) weighing to 200 g
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 paper towels
 red and blue litmus papers
 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

Where balance provision is limited, some candidates should be instructed to start the exam with different questions.

Materials

The materials listed in the table must be provided to each candidate. **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. For example, candidates may be supplied with sulfuric acid, labelled as FA 1, but be told in the question paper that FA 1 is phosphoric acid.**

label	per candidate	identity	notes
FA 1 [MH]	1.10 g	potassium carbonate	Provide 1.10 ± 0.10 g of K_2CO_3 [MH] in a stoppered container.
FA 2	70 cm ³	0.250 mol dm ⁻³ sulfuric acid	Dilute 250 cm ³ of 1.00 mol dm ⁻³ H_2SO_4 [MH] in each dm ³ of solution. For 1.00 mol dm ⁻³ H_2SO_4 , see preparation instructions in the current syllabus.
FA 3	150 cm ³	0.105 mol dm ⁻³ sodium hydroxide	Dissolve 4.20 g of NaOH [C] in each dm ³ of solution. The identity of FA 3 is different from that given in the question paper.
FA 4	150 cm ³	0.0500 mol dm ⁻³ sulfuric acid	Dilute 50.0 cm ³ of 1.00 mol dm ⁻³ H_2SO_4 [MH] in each dm ³ of solution. For 1.00 mol dm ⁻³ H_2SO_4 , see preparation instructions in the current syllabus.
FA 5 [F][MH][HH]	2 cm ³	bromophenol blue indicator	See preparation instructions in the current syllabus.
FA 6	20 cm ³	0.20 mol dm ⁻³ iron(II) sulfate	Add 55.6 g of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ [MH] to 100 cm ³ of 1.00 mol dm ⁻³ H_2SO_4 [MH] and make the solution up to 1 dm ³ with distilled water. For 1.00 mol dm ⁻³ H_2SO_4 , see preparation instructions in the current syllabus.
FA 7	20 cm ³	0.050 mol dm ⁻³ chromium(III) chloride	Dissolve 13.3 g of $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$ [MH] in each dm ³ of solution.
FA 8 [F][MH][HH]	5 cm ³	aqueous ethanol	Dilute 500.0 cm ³ of $\text{C}_2\text{H}_5\text{OH}$ [F][MH][HH] to 1 dm ³ . Supply in a stoppered container.
hydrogen peroxide	5 cm ³	10 vol hydrogen peroxide	Dilute 100 cm ³ of 100 vol H_2O_2 [C] to 1 dm ³ or dilute 500 cm ³ of 20 vol H_2O_2 [MH] to 1 dm ³ . Supply in a stoppered container.
sodium carbonate [MH]	1.0 g	sodium carbonate	Provide 0.9–1.1 g of Na_2CO_3 [MH] in a stoppered container. Any hydrated version is also suitable.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
dilute nitric acid [C]	10 cm ³	2.0 mol dm ⁻³ HNO ₃	
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aqueous sodium hydroxide [C]	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	
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.
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Supervisor's report

Syllabus and component number

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Centre number

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Signed (supervisor)

Name (in block capitals)



Cambridge International AS & A Level

CHEMISTRY

9701/37

Paper 3 Advanced Practical Skills 1

May/June 2025

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 1 × pipette filler
 1 × 50 cm³ burette
 2 × 150 cm³ or 250 cm³ conical flask
 1 × 25 cm³ measuring cylinder
 1 × 50 cm³ measuring cylinder
 1 × burette stand and clamp
 1 × 250 cm³ one-mark graduated volumetric flask (ISO1042 or grade B)
 1 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 2 × plastic or cardboard cup, capacity approximately 150 cm³
 1 × glass rod
 1 × stop-clock to measure to an accuracy of 1 second
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 3 × boiling tube
 8 × test-tube*
 1 × test-tube rack
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 1 × funnel (for filtering)
 2 × filter paper
 paper towels
 red and blue litmus papers
 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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label	per candidate	identity	notes
FA 1	110 cm ³	9 vol hydrogen peroxide	Dilute 90 cm ³ of freshly opened 100 vol H ₂ O ₂ [C] or dilute 450 cm ³ of freshly opened 20 vol H ₂ O ₂ [MH] to 1.0 dm ³ with distilled water.
FA 2	120 cm ³	0.0300 mol dm ⁻³ potassium manganate(VII)	Dissolve 4.74 g of KMnO ₄ [N][O][MH][HH] in each dm ³ of solution.
FA 3 [MH]	50 cm ³	1.0 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FA 5 [MH]	2.5 g	manganese(IV) oxide, MnO ₂	Provide 2.5 ± 0.1 g of powdered MnO ₂ [MH] in a stoppered container.
FA 6 [MH]	10 cm ³	0.10 mol dm ⁻³ iron(III) chloride	Dissolve 16.2 g FeCl ₃ [MH][C] or 27.0 g of FeCl ₃ •6H ₂ O [MH][C] in 500 cm ³ of 2.0 mol dm ⁻³ HCl and dilute the solution to 1 dm ³ . For 2.0 mol dm ⁻³ HCl, see preparation instructions in the current syllabus.
FA 7	10 cm ³	0.5 mol dm ⁻³ potassium iodide	Dissolve 83.0 g of KI in each dm ³ of solution.
distilled water	250 cm ³	distilled water	
iron(II) sulfate	5 cm ³	0.2 mol dm ⁻³ iron(II) sulfate	Dissolve 30.3 g of FeSO ₄ [MH] or 55.6 g of FeSO ₄ •7H ₂ O [MH] in 100 cm ³ of 1.00 mol dm ⁻³ sulfuric acid [MH] and make up to 1.0 dm ³ with distilled water.
starch solution	5 cm ³	starch solution	See preparation instructions in the current syllabus.
aqueous sodium carbonate	5 cm ³	0.5 mol dm ⁻³ sodium carbonate	Dissolve 53.0 g of Na ₂ CO ₃ [MH] or 143.0 g of Na ₂ CO ₃ •10H ₂ O [MH] in each dm ³ of solution.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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]	10 cm ³	2.0 mol dm ⁻³ NH ₃	
aqueous sodium hydroxide [C]	20 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	
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 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.

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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)



Cambridge International AS & A Level

CHEMISTRY

9701/38

Paper 3 Advanced Practical Skills 2

May/June 2025

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 document has 8 pages.

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 × 10 cm³ pipette
 1 × 25 cm³ pipette
 1 × pipette filler
 2 × 50 cm³ burette
 2 × 150 cm³ or 250 cm³ conical flask
 1 × 25 cm³ measuring cylinder
 2 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 1 × plastic or cardboard cup, capacity approximately 150 cm³
 1 × glass rod
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × boiling tube
 8 × test-tube*
 1 × test-tube rack
 1 × wash bottle containing distilled water
 1 × pen for labelling glassware
 paper towels
 red and blue litmus papers
 aluminium foil
 wooden splints
 the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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

Materials

The materials listed in the table must be provided to each candidate. **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FB 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper. For example, candidates may be supplied with sulfuric acid, labelled as FB 1, but be told in the question paper that FB 1 is phosphoric acid.**

label	per candidate	identity	notes
FB 1	120 cm ³	0.0500 mol dm ⁻³ iron(II) sulfate with dilute sulfuric acid	Dissolve 13.89 ± 0.02 g of FeSO ₄ •7H ₂ O [MH] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water. Provide in a stoppered container. This solution should be prepared as near to the time of the exam as possible.
FB 2	120 cm ³	0.0100 mol dm ⁻³ potassium manganate(VII) with dilute sulfuric acid	Dissolve 1.58 ± 0.02 g of KMnO ₄ [O][MH][HH][N] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water.
FB 3 [MH]	50 cm ³	1.00 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FB 4 [C]	100 cm ³	1.00 mol dm ⁻³ sodium hydroxide	See preparation instructions in the current syllabus.
FB 5	60 cm ³	2.00 mol dm ⁻³ hydrochloric acid	See preparation instructions in the current syllabus.
FB 6 [MH]	10 cm ³	2.00 mol dm ⁻³ ethanoic acid	Use 120 g of glacial ethanoic acid [C][F] diluted to 1.0 dm ³ . Supply in a stoppered container.
FB 7 [C]	10 cm ³	1.00 mol dm ⁻³ sodium hydroxide	Same solution as FB 4 .
FB 8	10 cm ³	10 vol hydrogen peroxide	Dilute 100 cm ³ of 100 vol H ₂ O ₂ [C] in each dm ³ of solution or dilute 500 cm ³ of 20 vol H ₂ O ₂ [MH] in each dm ³ of solution. Supply in a stoppered container.
FB 9 [MH]	1 g	0.5 g of anhydrous sodium carbonate + 0.5 g of ammonium bromide	Mix together 0.5 ± 0.1 g of Na ₂ CO ₃ [MH] and 0.5 ± 0.1 g of NH ₄ Br [MH] . Alternatively use 0.5 g of (NH ₄) ₂ CO ₃ [MH] mixed with 0.5 g of KBr. Provide in a stoppered container.
iron(II) sulfate	10 cm ³	0.2 mol dm ⁻³ iron(II) sulfate with dilute sulfuric acid	Dissolve 55.6 g of FeSO ₄ •7H ₂ O [MH] in approximately 200 cm ³ of 1.0 mol dm ⁻³ sulfuric acid. Make up to 1.0 dm ³ using distilled water. Provide in a stoppered container. This solution should be prepared as near to the time of the exam as possible.

label	per candidate	identity	notes
manganese(IV) oxide [MH]	0.5 g	solid manganese(IV) oxide	Provide 0.5 g $\pm$ 0.1 g of powdered MnO ₂ [MH] in a stoppered container.
magnesium [F]	2 $\times$ 1 cm length	magnesium ribbon	Provide two pieces of magnesium ribbon [F] each 1 cm length. The ribbon should be lightly sanded before cutting. Plenty of spare strips should be available in reserve.
aqueous chlorine [C][N]	5 cm ³	aqueous sodium chlorate(I)	Prepare by diluting domestic / commercial bleach [C][N] with an equal volume of water. Check the concentration is suitable by ensuring the solution decolourises litmus paper. May be supplied as sodium hypochlorite. Provide in a stoppered container.
distilled water	50 cm ³	distilled water	

The list of materials continues on the next page.

label	per candidate	identity	notes
dilute hydrochloric acid	10 cm ³	2.0 mol dm ⁻³ HCl	See preparation instructions in the current syllabus. If necessary, each of these reagents can be provided as a communal supply for groups of up to 6 candidates. Invigilators must be alert to the risk of contamination and the opportunity for malpractice when using a communal supply.
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Signed (supervisor)

Name (in block capitals)