



Cambridge International AS & A Level

CHEMISTRY

9701/31

Paper 3 Advanced Practical Skills 1

October/November 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

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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.
- 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.
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- The supervisor must complete a report for each practical session held and each laboratory used.
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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 × 25 cm³ measuring cylinder
 1 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 1 × glass rod
 1 × stop-clock to measure to an accuracy of 1 second
 3 × teat/dropping pipette
 1 × spatula
 1 × crucible with lid (approximate capacity 15 cm³)
 1 × crucible tongs
 1 × pipeclay triangle
 1 × tripod
 1 × gauze
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 8 × test-tube*
 2 × hard-glass test-tubes
 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
 1 × funnel (for filtering)
 1 × 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

* Candidates are expected to rinse and reuse test-tubes and boiling 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	150 cm ³	0.0492 mol dm ⁻³ ethanedioic acid OR sodium ethanedioate	Dissolve 6.20 g of (COOH) ₂ •2H ₂ O [MH] OR 6.59 g of Na ₂ C ₂ O ₄ [MH] in each dm ³ of solution. Ethanedioic acid may be known as oxalic acid.
FA 2 [MH]	150 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	Dissolve 3.16 g of KMnO ₄ [O][MH][HH][N] in each dm ³ of 0.5 mol dm ⁻³ H ₂ SO ₄ [MH] . See also FA 7 .
FA 3 [MH]	100 cm ³	1.00 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FA 4 [C][MH][N]	3.20 ± 0.20 g	hydrated zinc sulfate	Provide 3.20 ± 0.20 g ZnSO ₄ •7H ₂ O [C][MH][N] in a stoppered container.
FA 5	2.0 ± 0.1 g	hydrated magnesium sulfate	Provide 2.0 ± 0.1 g MgSO ₄ •7H ₂ O in a stoppered container.
FA 6 [O][MH][HH][N]	0.4 ± 0.1 g	potassium manganate(VII)	Provide 0.4 ± 0.1 g KMnO ₄ [O][MH][HH][N] in a stoppered container.
FA 7 [MH]	10 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	This is the same as FA 2 .
FA 8	10 cm ³	0.10 mol dm ⁻³ hydrated manganese(II) sulfate OR hydrated manganese(II) chloride	Dissolve 16.9 g of MnSO ₄ •H ₂ O [HH][N] OR 19.8 g of MnCl ₂ •4H ₂ O [MH] in each dm ³ of solution. Note: MnSO ₄ •H ₂ O needs agitation with water in order to dissolve.
FA 9 [MH]	2.0 ± 0.2 g	manganese(IV) oxide	Provide 2.0 ± 0.2 g MnO ₂ [MH] in a stoppered container.
hydrogen peroxide	10 cm ³	10-vol hydrogen peroxide	Dilute 100 cm ³ 100-vol H ₂ O ₂ [C] or 500 cm ³ 20-vol H ₂ O ₂ [MH] to 1 dm ³ .
aqueous iron(II) sulfate [MH]	10 cm ³	0.20 mol dm ⁻³ iron(II) sulfate	Dissolve 55.6 g FeSO ₄ •7H ₂ O [MH] in each dm ³ of 1.0 mol dm ⁻³ H ₂ SO ₄ [MH] .

Compounds with water of crystallisation: any number of water molecules is acceptable, provided it is noted in the supervisor's report.

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).

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Signed (supervisor)

Name (in block capitals)



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 1 × 50 cm³ measuring cylinder
 2 × burette stand and clamp
 2 × 100 cm³ beaker
 1 × 250 cm³ beaker
 1 × funnel (for filling burette)
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 1 × 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 × tripod
 1 × gauze
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × boiling tube
 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.

A bucket labelled **quenching bath** must be provided.

The bucket must contain 1 dm³ of 5% sodium carbonate solution (made up by dissolving 50 g of Na₂CO₃ **[MH]** or 135 g of Na₂CO₃·10H₂O **[MH]** in 1 dm³ of water) and universal indicator **[F]**.

The supervisor must monitor the colour of the universal indicator in each quenching bath to check that the solution has **not** become acidic. If the solution becomes acidic, the supervisor must add more 5% sodium carbonate solution to the quenching bath.

Materials

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label	per candidate	identity	notes
FA 1	200 cm ³	0.100 mol dm ⁻³ sodium thiosulfate	Dissolve 15.82 g of Na ₂ S ₂ O ₃ or 24.82 g of Na ₂ S ₂ O ₃ •5H ₂ O in each dm ³ of solution.
FA 2	70 cm ³	2.00 mol dm ⁻³ hydrochloric acid	See preparation instructions in the current syllabus.
FA 3	5.0 ± 0.1 g	hydrated sodium thiosulfate	Provide 5.0 ± 0.1 g of Na ₂ S ₂ O ₃ •5H ₂ O in a stoppered container.
FA 4 [MH]	20 cm ³	0.20 mol dm ⁻³ iron(III) sulfate	Dissolve 112.4 g of Fe ₂ (SO ₄) ₃ •9H ₂ O [MH] in each dm ³ of solution using 1.0 mol dm ⁻³ H ₂ SO ₄ [MH] instead of distilled water. 96.4 g of NH ₄ Fe(SO ₄) ₂ •12H ₂ O [MH] may be used instead (prepare in the same way).
FA 5 [C]	20 cm ³	0.20 mol dm ⁻³ aluminium sulfate	Dissolve 68.4 g of Al ₂ (SO ₄) ₃ [C] or 51.6 g of AlK(SO ₄) ₂ in each dm ³ of solution. Any hydrated form of either chemical may be used as an alternative.
FA 6 [MH]	10 cm ³	1.0 mol dm ⁻³ methanoic acid	Dilute 42.0 cm ³ of 90.0% HCOOH [C] to 1 dm ³ . Provide in a stoppered container.
FA 7 [F][MH]	10 cm ³	propan-2-ol	Provide 5.0 cm ³ of CH ₃ CH(OH)CH ₃ [F][MH] in a stoppered container.
aqueous sodium carbonate	10 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 1 dm ³ of solution.
aqueous iodine	5 cm ³	0.10 mol dm ⁻³ iodine, dissolved in 0.50 mol dm ⁻³ aqueous potassium iodide	Dissolve 83.0 g of KI in each dm ³ of solution. Then add 25.4 g of I ₂ [MH][N] to the solution and stir until dissolved.
distilled water	150 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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Name (in block capitals)



Cambridge International AS & A Level

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 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
 2 × teat/dropping pipette
 1 × spatula
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 2 × 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
 red and blue litmus papers
 aluminium foil
 wooden splints
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Materials

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label	per candidate	identity	notes
FB 1	80 cm ³	2.0 mol dm ⁻³ hydrochloric acid	See preparation instructions in the present syllabus.
FB 2	2.5 g	sodium hydrogencarbonate	Each candidate should be provided with 2.5±0.1 g of NaHCO ₃ in a stoppered container.
FB 3 [MH]	2.5 g	anhydrous sodium carbonate	Each candidate should be provided with 2.0±0.1 g of Na ₂ CO ₃ [MH] in a stoppered container. A freshly opened supply of anhydrous sodium carbonate should be used.
FB 4	120 cm ³	0.190 mol dm ⁻³ sodium hydrogencarbonate and 0.0205 mol dm ⁻³ sodium chloride	Dissolve 16.00 g of NaHCO ₃ and 1.20 g of NaCl in each dm ³ of solution.
FB 5	150 cm ³	0.200 mol dm ⁻³ hydrochloric acid	Dilute 100 cm ³ of 2.0 mol dm ⁻³ hydrochloric acid to 1 dm ³ . For preparation of 2.0 mol dm ⁻³ hydrochloric acid, see preparation instructions in the present syllabus.
FB 6 [T][C][N][F][H][MH]	10 cm ³	methyl orange indicator	See preparation instructions in the present syllabus.
FB 7 [MH][N]	2.0 g	basic copper(II) carbonate	Each candidate should be provided with approximately 2.0 g of CuCO ₃ •Cu(OH) ₂ [MH][N] in a stoppered container. Any basic copper(II) carbonate is suitable.
FB 8	10 cm ³	0.1 mol dm ⁻³ iron(II) sulfate	Dissolve 27.80 g of FeSO ₄ •7H ₂ O [MH] in each dm ³ of 0.1 mol dm ⁻³ sulfuric acid. To prepare 0.1 mol dm ⁻³ sulfuric acid, dilute 100 cm ³ of 1.0 mol dm ⁻³ sulfuric acid [MH] to 1 dm ³ . For preparation of 1.0 mol dm ⁻³ sulfuric acid [MH], see preparation instructions in the present 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	

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Supervisor's report

Syllabus and component 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

October/November 2025

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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

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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.
- 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.
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After the exam

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 1 × white tile
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 1 × glass rod
 1 × stop-clock to measure to an accuracy of 1 second
 3 × teat/dropping pipette
 1 × spatula
 1 × crucible with lid (approximate capacity 15 cm³)
 1 × crucible tongs
 1 × pipeclay triangle
 1 × tripod
 1 × gauze
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 8 × test-tube*
 2 × hard-glass test-tubes
 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
 1 × funnel (for filtering)
 1 × 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

* Candidates are expected to rinse and reuse test-tubes and boiling 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	150 cm ³	0.0492 mol dm ⁻³ ethanedioic acid OR sodium ethanedioate	Dissolve 6.20 g of (COOH) ₂ •2H ₂ O [MH] OR 6.59 g of Na ₂ C ₂ O ₄ [MH] in each dm ³ of solution. Ethanedioic acid may be known as oxalic acid.
FA 2 [MH]	150 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	Dissolve 3.16 g of KMnO ₄ [O][MH][HH][N] in each dm ³ of 0.5 mol dm ⁻³ H ₂ SO ₄ [MH] . See also FA 7 .
FA 3 [MH]	100 cm ³	1.00 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FA 4 [C][MH][N]	3.20 ± 0.20 g	hydrated zinc sulfate	Provide 3.20 ± 0.20 g ZnSO ₄ •7H ₂ O [C][MH][N] in a stoppered container.
FA 5	2.0 ± 0.1 g	hydrated magnesium sulfate	Provide 2.0 ± 0.1 g MgSO ₄ •7H ₂ O in a stoppered container.
FA 6 [O][MH][HH][N]	0.4 ± 0.1 g	potassium manganate(VII)	Provide 0.4 ± 0.1 g KMnO ₄ [O][MH][HH][N] in a stoppered container.
FA 7 [MH]	10 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	This is the same as FA 2 .
FA 8	10 cm ³	0.10 mol dm ⁻³ hydrated manganese(II) sulfate OR hydrated manganese(II) chloride	Dissolve 16.9 g of MnSO ₄ •H ₂ O [HH][N] OR 19.8 g of MnCl ₂ •4H ₂ O [MH] in each dm ³ of solution. Note: MnSO ₄ •H ₂ O needs agitation with water in order to dissolve.
FA 9 [MH]	2.0 ± 0.2 g	manganese(IV) oxide	Provide 2.0 ± 0.2 g MnO ₂ [MH] in a stoppered container.
hydrogen peroxide	10 cm ³	10-vol hydrogen peroxide	Dilute 100 cm ³ 100-vol H ₂ O ₂ [C] or 500 cm ³ 20-vol H ₂ O ₂ [MH] to 1 dm ³ .
aqueous iron(II) sulfate [MH]	10 cm ³	0.20 mol dm ⁻³ iron(II) sulfate	Dissolve 55.6 g FeSO ₄ •7H ₂ O [MH] in each dm ³ of 1.0 mol dm ⁻³ H ₂ SO ₄ [MH] .

Compounds with water of crystallisation: any number of water molecules is acceptable, provided it is noted in the supervisor's report.

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

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Signed (supervisor)

Name (in block capitals)



Cambridge International AS & A Level

CHEMISTRY

9701/36

Paper 3 Advanced Practical Skills 2

October/November 2025

CONFIDENTIAL INSTRUCTIONS

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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.
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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.
- 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:
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Specific information for this practical exam

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Apparatus

The apparatus listed must be provided to each candidate.

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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 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × glass rod
 1 × stop-clock (to measure to an accuracy of 1 second)
 2 × teat/dropping pipette
 1 × spatula
 1 × crucible with lid (approximate capacity 15 cm³)
 1 × crucible tongs
 1 × pipeclay triangle
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × hard-glass test-tube
 1 × boiling 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 suitable for labelling glassware
 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 re-use test-tubes and boiling tubes where possible. Additional tubes should be available.

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

Materials

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Label	per candidate	identity	notes
FB 1 [C]	2.2 g	hydrated aluminium sulfate	Provide 2.2 ± 0.1 g of $Al_2(SO_4)_3 \cdot 16H_2O$ [C] in a stoppered container.
FB 2 [MH]	120 cm ³	0.108 mol dm ⁻³ iron(II) sulfate	Mix 30.00 g of $FeSO_4 \cdot 7H_2O$ [MH] with 100 cm ³ of 1.0 mol dm ⁻³ sulfuric acid [MH] and make up to 1.00 dm ³ with distilled water.
FB 3	120 cm ³	0.0220 mol dm ⁻³ potassium manganate(VII)	Dissolve 3.48 g of $KMnO_4$ [O][MH][H][N] in each dm ³ .
FB 4 [MH]	50 cm ³	1.0 mol dm ⁻³ sulfuric acid	See preparation instructions in current syllabus.
FB 5 [F][N]	2.0 g	zinc powder	Provide 2.0 ± 0.1 g of Zn powder [F][N] in a stoppered container.
FB 6 [C][N]	5 cm ³	0.20 mol dm ⁻³ zinc sulfate	Dissolve 57.5 g of $ZnSO_4 \cdot 7H_2O$ [C][MH][N] in each dm ³ .
FB 7	2.0 g	(basic) zinc carbonate	Provide 2.0 ± 0.1 g of $ZnCO_3 \cdot Zn(OH)_2$ in a stoppered container. Any commercially supplied zinc carbonate is suitable.
copper(II) sulfate [C][N]	5 cm ³	0.50 mol dm ⁻³ copper(II) sulfate	Dissolve 125.0 g of $CuSO_4 \cdot 5H_2O$ [C][MH][N] in each dm ³ .
iron(III) chloride [C]	5 cm ³	0.50 mol dm ⁻³ iron(III) chloride	To 135.0 g of $FeCl_3 \cdot 6H_2O$ [MH][C], add 250 cm ³ of 2.0 mol dm ⁻³ hydrochloric acid, then make up to 1.0 dm ³ with distilled water. For 2.00 mol dm ⁻³ HCl, see preparation instructions in 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	

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Supervisor's report

Syllabus and component 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

October/November 2025

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 1 × 100 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × thermometer (−10 °C to +110 °C at 1 °C)
 1 × glass rod
 1 × stop-clock to measure to an accuracy of 1 second
 3 × teat/dropping pipette
 1 × spatula
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 1 × crucible tongs
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 1 × tripod
 1 × gauze
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 8 × test-tube*
 2 × hard-glass test-tubes
 1 × test-tube rack
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FA 2 [MH]	150 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	Dissolve 3.16 g of KMnO ₄ [O][MH][HH][N] in each dm ³ of 0.5 mol dm ⁻³ H ₂ SO ₄ [MH] . See also FA 7 .
FA 3 [MH]	100 cm ³	1.00 mol dm ⁻³ sulfuric acid	See preparation instructions in the current syllabus.
FA 4 [C][MH][N]	3.20 ± 0.20 g	hydrated zinc sulfate	Provide 3.20 ± 0.20 g ZnSO ₄ •7H ₂ O [C][MH][N] in a stoppered container.
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FA 6 [O][MH][HH][N]	0.4 ± 0.1 g	potassium manganate(VII)	Provide 0.4 ± 0.1 g KMnO ₄ [O][MH][HH][N] in a stoppered container.
FA 7 [MH]	10 cm ³	0.0200 mol dm ⁻³ acidified potassium manganate(VII)	This is the same as FA 2 .
FA 8	10 cm ³	0.10 mol dm ⁻³ hydrated manganese(II) sulfate OR hydrated manganese(II) chloride	Dissolve 16.9 g of MnSO ₄ •H ₂ O [HH][N] OR 19.8 g of MnCl ₂ •4H ₂ O [MH] in each dm ³ of solution. Note: MnSO ₄ •H ₂ O needs agitation with water in order to dissolve.
FA 9 [MH]	2.0 ± 0.2 g	manganese(IV) oxide	Provide 2.0 ± 0.2 g MnO ₂ [MH] in a stoppered container.
hydrogen peroxide	10 cm ³	10-vol hydrogen peroxide	Dilute 100 cm ³ 100-vol H ₂ O ₂ [C] or 500 cm ³ 20-vol H ₂ O ₂ [MH] to 1 dm ³ .
aqueous iron(II) sulfate [MH]	10 cm ³	0.20 mol dm ⁻³ iron(II) sulfate	Dissolve 55.6 g FeSO ₄ •7H ₂ O [MH] in each dm ³ of 1.0 mol dm ⁻³ H ₂ SO ₄ [MH] .

Compounds with water of crystallisation: any number of water molecules is acceptable, provided it is noted in the supervisor's report.

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:
 - 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

October/November 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 × 25 cm³ measuring cylinder
 1 × burette stand and clamp
 1 × 100 cm³ beaker
 1 × funnel (for filling burette)
 1 × white tile
 1 × glass rod
 1 × stop-clock (to measure to an accuracy of 1 second)
 2 × teat/dropping pipette
 1 × spatula
 1 × crucible with lid (approximate capacity 15 cm³)
 1 × crucible tongs
 1 × pipeclay triangle
 1 × Bunsen burner
 1 × heat-proof mat
 1 × test-tube holder
 1 × hard-glass test-tube
 1 × boiling 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 suitable for labelling glassware
 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 re-use test-tubes and boiling tubes where possible. Additional 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 [C]	2.2 g	hydrated aluminium sulfate	Provide 2.2 ± 0.1 g of $Al_2(SO_4)_3 \cdot 16H_2O$ [C] in a stoppered container.
FB 2 [MH]	120 cm ³	0.108 mol dm ⁻³ iron(II) sulfate	Mix 30.00 g of $FeSO_4 \cdot 7H_2O$ [MH] with 100 cm ³ of 1.0 mol dm ⁻³ sulfuric acid [MH] and make up to 1.00 dm ³ with distilled water.
FB 3	120 cm ³	0.0220 mol dm ⁻³ potassium manganate(VII)	Dissolve 3.48 g of $KMnO_4$ [O][MH][H][N] in each dm ³ .
FB 4 [MH]	50 cm ³	1.0 mol dm ⁻³ sulfuric acid	See preparation instructions in current syllabus.
FB 5 [F][N]	2.0 g	zinc powder	Provide 2.0 ± 0.1 g of Zn powder [F][N] in a stoppered container.
FB 6 [C][N]	5 cm ³	0.20 mol dm ⁻³ zinc sulfate	Dissolve 57.5 g of $ZnSO_4 \cdot 7H_2O$ [C][MH][N] in each dm ³ .
FB 7	2.0 g	(basic) zinc carbonate	Provide 2.0 ± 0.1 g of $ZnCO_3 \cdot Zn(OH)_2$ in a stoppered container. Any commercially supplied zinc carbonate is suitable.
copper(II) sulfate [C][N]	5 cm ³	0.50 mol dm ⁻³ copper(II) sulfate	Dissolve 125.0 g of $CuSO_4 \cdot 5H_2O$ [C][MH][N] in each dm ³ .
iron(III) chloride [C]	5 cm ³	0.50 mol dm ⁻³ iron(III) chloride	To 135.0 g of $FeCl_3 \cdot 6H_2O$ [MH][C], add 250 cm ³ of 2.0 mol dm ⁻³ hydrochloric acid, then make up to 1.0 dm ³ with distilled water. For 2.00 mol dm ⁻³ HCl, see preparation instructions in 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	

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Signed (supervisor)

Name (in block capitals)