Cambridge Assessment International Education

Cambridge International AS & A Level

CHEMISTRY **9701/31**

Paper 3 Advanced Practical Skills 1 **October/November 2022**

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.

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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

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- 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.
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- Each packet of scripts returned to Cambridge International must contain the following items:
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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

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1 × pipette filler
1 × 50 cm^3 burette
2 × 150 cm^3 or 250 cm^3 conical flask
1 × 25 cm^3 measuring cylinder
1 × burette stand and clamp
1 × 100 cm^3 beaker
1 × 250 cm^3 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 cm^3
1 × glass rod
2 × teat/dropping pipette
1 × spatula
1 × tripod
1 × gauze
1 × Bunsen burner
1 × heat-proof mat
1 × test-tube holder
2 × 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
1 × 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 reuse 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.

label	per candidate	identity	notes (hazards given in this column are for the raw materials)
FA 1	150 cm^3	0.0500 mol dm^{-3} ethanedioic acid	Dissolve 6.30 g of $(COOH)_2 \cdot 2H_2O$ **[MH]** in each dm^3 of solution.
FA 2 [MH]	150 cm^3	0.0200 mol dm^{-3} acidified potassium manganate(VII)	Dissolve 3.16 g of $KMnO_4$ **[MH][N][O]** in each dm^3 of 0.5 mol dm^{-3} H_2SO_4 **[MH]**.
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]	5.0 g	hydrated copper(II) sulfate	Provide 5.0 ± 0.2 g of $CuSO_4 \cdot 5H_2O$ **[C][MH][N]** in a stoppered container.
FA 5 [C][MH][N]	1.5 g	anhydrous copper(II) sulfate	Provide 1.5 ± 0.1 g of $CuSO_4$ **[C][MH][N]** in a stoppered container.
FA 6 [N]	20 cm^3	0.2 mol dm^{-3} of zinc nitrate and 0.2 mol dm^{-3} potassium iodide	Dissolve 59.4 g of $Zn(NO_3)_2 \cdot 6H_2O$ **[O][MH][N]** and 33.2 g of KI in each dm^3 of solution.
FA 7 [F][MH]	5 cm^3	butan-2-ol	Provide in a stoppered container. If the centre is unable to provide butan-2-ol **[F][MH]** then ethanol **[F][MH][HH]** may be used.
hydrogen peroxide	5 cm^3	10 vol hydrogen peroxide	Dilute 100 cm^3 of 100 vol H_2O_2 **[C]** in each dm^3 of solution.
aqueous iodine	5 cm^3	0.05 mol dm^{-3} iodine dissolved in 0.02 mol dm^{-3} potassium iodide	Prepare KI solution by dissolving 3.32 g of KI in each dm^3 of solution. Dissolve 12.7 g of I_2 **[MH][N]** in each dm^3 of this KI solution.

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label	per candidate	identity	notes (hazards given in this column are for the raw materials)
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_2SO_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_2SO_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.
- **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FA 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper.**

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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

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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Cambridge Assessment International Education

Cambridge International AS & A Level

CHEMISTRY **9701/33**

Paper 3 Advanced Practical Skills 1 **October/November 2022**

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1 × 50 cm^3 burette
2 × 150 cm^3 or 250 cm^3 conical flask
1 × 25 cm^3 measuring cylinder
1 × burette stand and clamp
1 × 250 cm^3 one-mark graduated volumetric flask (ISO1042 or grade B)
1 × 100 cm^3 beaker
1 × 250 cm^3 beaker
1 × funnel (for filling burette)
1 × white tile
1 × glass rod
2 × teat/dropping pipette
1 × spatula
1 × crucible with lid (approximate capacity 15 cm^3)
1 × crucible tongs
1 × pipe-clay triangle
1 × tripod
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 for testing nitrate/nitrite
wooden splints
the apparatus normally used in the centre for use with limewater in testing for carbon dioxide

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Materials

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FA 1 [MH]	5.0 g	hydrated ammonium iron(II) sulfate	Provide 4.8–5.2 g of $(NH_4)_2Fe(SO_4)_2 \cdot 6H_2O$ **[MH]** in a stoppered container. This may be labelled hydrated diammonium ferrous sulfate by some manufacturers.
FA 2 [MH]	120 cm^3	0.01 mol dm^{-3} potassium manganate(VII) in 0.5 mol dm^{-3} H_2SO_4	See preparation instructions in the current syllabus.
FA 3 [MH]	80 cm^3	1.0 mol dm^{-3} sulfuric acid	See preparation instructions in the current syllabus.
FA 5	1.6 g	hydrated magnesium sulfate	Provide 1.5–1.7 g of $MgSO_4 \cdot 7H_2O$ in a stoppered container.
FA 6	25 cm^3	0.10 mol dm^{-3} ammonium iron(III) sulfate in 0.10 mol dm^{-3} sulfuric acid	Dissolve 48.2g of $NH_4Fe(SO_4)_2 \cdot 12H_2O$ **[MH]** in each dm^3 of 0.10 mol dm^{-3} H_2SO_4. To prepare 0.10 mol dm^{-3} H_2SO_4 dilute ten-fold 1.0 mol dm^{-3} sulfuric acid **[MH]** (see preparation instructions in the current syllabus).
FA 7	10 cm^3	0.10 mol dm^{-3} sodium bromide	Dissolve 10.3 g of NaBr in each dm^3 of solution.
FA 8	10 cm^3	0.50 mol dm^{-3} sodium carbonate	Dissolve 53.0 g of Na_2CO_3 **[MH]** or 143.1 g of $Na_2CO_3 \cdot 10H_2O$ **[MH]** in each dm^3 of solution.
FA 9	10 cm^3	0.10 mol dm^{-3} sodium chloride	Dissolve 5.85 g of NaC*l* in each dm^3 of solution.
aqueous sodium sulfite [MH]	5 cm^3	0.10 mol dm^{-3} sodium sulfite	Dissolve 12.6 g of Na_2SO_3 **[C][MH]** in each dm^3 of solution. Prepare the solution as near to the examination as possible and keep in a stoppered bottle.
aqueous potassium iodide	5 cm^3	0.10 mol dm^{-3} potassium iodide	Dissolve 16.6 g of 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.
distilled water	200 cm^3	distilled water	Supplied in a wash bottle.

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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) .....

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Cambridge Assessment International Education

Cambridge International AS & A Level

CHEMISTRY **9701/34**

Paper 3 Advanced Practical Skills 2 **October/November 2022**

CONFIDENTIAL INSTRUCTIONS

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1 × thermometer (–10 °C to +110 °C at 1 °C)
1 × plastic or cardboard cup, capacity approximately 150 cm^3
1 × glass rod
2 × teat/dropping pipette
1 × spatula
1 × crucible with lid (approximate capacity 15 cm^3)
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1 × Bunsen burner
1 × heat-proof mat
1 × test-tube holder
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Materials

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label	per candidate	identity	notes (hazards given in this column are for the raw materials)
FB 1 [C][N]	50 cm^3	0.80 mol dm^{-3} copper(II) sulfate	Dissolve 199.7 g of $CuSO_4 \cdot 5H_2O$ **[C][MH][N]** in each dm^3 of solution.
FB 2 [F][N]	2.0 g	zinc metal powder	Provide 2.0 ± 0.1 g of Zn **[F][N]** in a stoppered container. Check that the metal powder reacts readily with dilute H_2SO_4 or provide from a fresh supply.
FB 3 [MH][N]	2.0 g	basic copper(II) carbonate	Provide 2.0 ± 0.1 g of $CuCO_3 \cdot Cu(OH)_2$ **[MH][N]** in a stoppered container. Any copper(II) carbonate or basic copper(II) carbonate is suitable.
FB 4 [C][N]	15 cm^3	0.20 mol dm^{-3} copper(II) sulfate	Dissolve 49.9 g of $CuSO_4 \cdot 5H_2O$ **[C][MH][N]** in each dm^3 of solution. Diluting 250 cm^3 of **FB 1 [C][MH][N]** to 1 dm^3 is also suitable.
FB 5	15 cm^3	0.20 mol dm^{-3} glucose	Dissolve 36.0 g of $C_6H_{12}O_6$ in each dm^3 of solution.
aqueous EDTA	10 cm^3	0.20 mol dm^{-3} disodium salt of bis[bis(carboxymethyl)amino]ethane	Dissolve 74.5 g of $[CH_2N(CH_2COOH)CH_2COONa]_2 \cdot 2H_2O$ **[MH]** each dm^3 of solution. This is also supplied as disodium salt of EDTA (ethylenediaminetetraacetic acid) dihydrate.
Mg [F]	1 × 1.5 cm	magnesium ribbon	Provide a 1–2 cm strip of cleaned Mg ribbon **[F]** in a stoppered container.
aqueous sodium carbonate [MH]	5 cm^3	1.0 mol dm^{-3} sodium carbonate	Dissolve 286 g of $Na_2CO_3 \cdot 10H_2O$ **[MH]** or 106 g of Na_2CO_3 in each dm^3 of solution.

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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

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.

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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.

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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) .....

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Cambridge Assessment International Education

Cambridge International AS & A Level

CHEMISTRY **9701/35**

Paper 3 Advanced Practical Skills 1 **October/November 2022**

CONFIDENTIAL INSTRUCTIONS

8714969403

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.

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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.

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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

1 × 25 cm^3 pipette
1 × pipette filler
1 × 50 cm^3 burette
2 × 150 cm^3 or 250 cm^3 conical flask
1 × 25 cm^3 measuring cylinder
1 × burette stand and clamp
1 × 100 cm^3 beaker
1 × 250 cm^3 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 cm^3
1 × glass rod
2 × teat/dropping pipette
1 × spatula
1 × tripod
1 × gauze
1 × Bunsen burner
1 × heat-proof mat
1 × test-tube holder
2 × 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
1 × 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 reuse 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.

label	per candidate	identity	notes (hazards given in this column are for the raw materials)
FA 1	150 cm^3	0.0500 mol dm^{-3} ethanedioic acid	Dissolve 6.30 g of $(COOH)_2 \cdot 2H_2O$ **[MH]** in each dm^3 of solution.
FA 2 [MH]	150 cm^3	0.0200 mol dm^{-3} acidified potassium manganate(VII)	Dissolve 3.16 g of $KMnO_4$ **[MH][N][O]** in each dm^3 of 0.5 mol dm^{-3} H_2SO_4 **[MH]**.
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]	5.0 g	hydrated copper(II) sulfate	Provide 5.0 ± 0.2 g of $CuSO_4 \cdot 5H_2O$ **[C][MH][N]** in a stoppered container.
FA 5 [C][MH][N]	1.5 g	anhydrous copper(II) sulfate	Provide 1.5 ± 0.1 g of $CuSO_4$ **[C][MH][N]** in a stoppered container.
FA 6 [N]	20 cm^3	0.2 mol dm^{-3} of zinc nitrate and 0.2 mol dm^{-3} potassium iodide	Dissolve 59.4 g of $Zn(NO_3)_2 \cdot 6H_2O$ **[O][MH][N]** and 33.2 g of KI in each dm^3 of solution.
FA 7 [F][MH]	5 cm^3	butan-2-ol	Provide in a stoppered container. If the centre is unable to provide butan-2-ol **[F][MH]** then ethanol **[F][MH][HH]** may be used.
hydrogen peroxide	5 cm^3	10 vol hydrogen peroxide	Dilute 100 cm^3 of 100 vol H_2O_2 **[C]** in each dm^3 of solution.
aqueous iodine	5 cm^3	0.05 mol dm^{-3} iodine dissolved in 0.02 mol dm^{-3} potassium iodide	Prepare KI solution by dissolving 3.32 g of KI in each dm^3 of solution. Dissolve 12.7 g of I_2 **[MH][N]** in each dm^3 of this KI solution.

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label	per candidate	identity	notes (hazards given in this column are for the raw materials)
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_2SO_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_2SO_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.
- **Materials must be labelled only as specified in the 'label' column. The identities of chemicals labelled with letter codes, e.g. FA 1, may be different from their descriptions in the question paper. Candidates must use the descriptions given in the question paper.**

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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

Centre name .....

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Signed ..... (supervisor)

Name (in block capitals) .....

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Cambridge Assessment International Education

Cambridge International AS & A Level

CHEMISTRY **9701/36**

Paper 3 Advanced Practical Skills 2 **October/November 2022**

CONFIDENTIAL INSTRUCTIONS

1162998530

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After the exam

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1 × 25 cm^3 pipette
1 × pipette filler
1 × 50 cm^3 burette
2 × 150 cm^3 or 250 cm^3 conical flask
1 × 50 cm^3 measuring cylinder
1 × burette stand and clamp
1 × 250 cm^3 one-mark graduated volumetric flask (ISO1042 or grade B)
1 × 100 cm^3 beaker
1 × 250 cm^3 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 cm^3
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
2 × boiling tube*
1 × hard-glass test-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
1 × pen for labelling glassware
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Materials

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

label	per candidate	identity	notes (hazards given in this column are for the raw materials)
FB 1 [MH]	150 cm^3	3.0 mol dm^{-3} hydrochloric acid	Dilute 255 cm^3 of concentrated (35–37%; approximately 11 mol dm^{-3}) hydrochloric acid **[C][MH]** to 1 dm^3.
FB 2	120 cm^3	0.0613 mol dm^{-3} sodium carbonate	Dissolve 6.50 g of Na_2CO_3 **[MH]** in each dm^3 of solution. A fresh supply of Na_2CO_3 should be used.
FB 3 [F][HH][MH]	5 cm^3	bromophenol blue indicator	See preparation instructions in current syllabus.
FB 5 [MH]	3.5 g	anhydrous sodium carbonate	Provide 3.5–3.6 g of Na_2CO_3 **[MH]** in a stoppered container. A fresh supply of Na_2CO_3 should be used.
FB 6 [MH]	9.0 g	hydrated sodium carbonate	Provide 9.0–9.1 g of $Na_2CO_3 \cdot 10H_2O$ **[MH]** in a stoppered container. A fresh supply of $Na_2CO_3 \cdot 10H_2O$ should be used.
FB 7	20 cm^3	a mixture of 0.2 mol dm^{-3} sodium bromide and 0.2 mol dm^{-3} sodium sulfate	Dissolve 20.6 g of NaBr and 28.4 g of Na_2SO_4 in each dm^3 of solution. (64.4 g of $Na_2SO_4 \cdot 10H_2O$ may be used as an alternative)
FB 8	2.0 g	zinc carbonate	Provide 2.0–2.1 g of $ZnCO_3$ in a stoppered container.
distilled water	300 cm^3	distilled water	

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label	per candidate	identity	notes (hazards given in this column are for the raw materials)
dilute hydrochloric acid	20 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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Supervisor's report

Syllabus and component number | | | | | / | | |

Centre number | | | | | |

Centre name .....

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Signed ..... (supervisor)

Name (in block capitals) .....

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