

www.papacambridge.com UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Advanced Subsidiary Level and Advanced Level

### **CHEMISTRY**

Advanced Practical Skills 1

CONFIDENTIAL INSTRUCTIONS

Great care should be taken to ensure that any confidential information given does not reach the candidates either directly or indirectly.

The Supervisor's attention is drawn to the form on page 7 which must be completed and returned with the scripts.

If you have any problems or queries regarding these Instructions, please contact CIE by e-mail: info@cie.org.uk, by phone: +44 1223 553554, by fax +44 1223 553558, stating the Centre number, the nature of the query and the syllabus number quoted above.

This document consists of 8 printed pages.



[Turn over

9701/35

May/June 2013

# Safety

2

Supervisors are advised to remind candidates that all substances in the examination should be with caution.

www.papaCambridge.com Only those tests described in the question paper should be attempted. Please also see under 'Apparate on the use of pipette fillers, safety goggles and plastic gloves.

In accordance with COSHH (Control of Substances Hazardous to Health) Regulations, operative in the UK, a hazard appraisal of the examination has been carried out.

Attention is drawn in particular, to certain materials used in the examination. The following codes are used where relevant.

С corrosive substance

- highly flammable substance F.
- н harmful or irritating substance Т
  - 0 toxic substance Ν
- oxidising substance dangerous for the environment

The attention of Supervisors is drawn to any local regulations relating to safety and first-aid.

'Hazard Data Sheets', relating to materials used in this examination, should be available from your chemical supplier.

# Before the Examination

#### 1 Access to the question paper is NOT permitted in advance of the examination.

#### 2 **Preparation of materials**

Where quantities are specified for each candidate, they are sufficient for the experiments described in the question paper to be completed.

In preparing materials, the bulk quantity for each substance should be increased by 25% as spare material should be available to cover accidental loss. More material may be supplied if requested by candidates, without penalty.

All solutions should be bulked and mixed thoroughly before use to ensure uniformity.

Every effort should be made to keep the concentrations accurate to within one part in two hundred of those specified.

# Supervisors are asked to carry out any confirmatory tests given on page 4 to ensure the materials supplied are appropriate.

If the concentrations differ slightly from those specified, the Examiners will make the necessary allowance. They should be informed of the exact concentrations.

### Labelling of materials 3

Materials must be labelled as specified in these Instructions. Materials with an FA code number should be so labelled without the identities being included on the label. Where appropriate the identity of an FA coded chemical is given in the guestion paper itself.

### Identity of materials 4

It should be noted that descriptions of solutions given in the question paper may not correspond exactly with the specifications in these Instructions. The candidates must assume the descriptions given in the question paper.

### Size of group 5

In view of the difficulty of the preparation of large quantities of solution of uniform concentration, it is recommended that the maximum number of candidates per group be 30 and that separate supplies of solutions be prepared for each group.

# **Apparatus**

3

- 1 In addition to the fittings ordinarily contained in a chemical laboratory, the apparatus and n specified below will be necessary.
- www.papaCambridge.com 2 Pipette fillers (or equivalent safety devices), safety goggles and disposable gloves should be used where necessary.
- For each candidate 3
  - $1 \times 250 \, \text{cm}^3$  beaker
  - 1 × foamed plastic (polystyrene) cup
  - $1 \times 25 \, \text{cm}^3$  measuring cylinder
  - $1 \times$  thermometer  $-10 \degree$ C to  $+110 \degree$ C at  $1 \degree$ C
  - $1 \times \text{stop clock}$  (stop watch) or sight of a clock with a seconds display
  - $1 \times glass rod$
  - $1 \times \text{test-tube holder}$
  - $9 \times test-tube^*$
  - $3 \times \text{boiling tube}^*$
  - $1 \times \text{test-tube rack}$
  - 2 × teat/dropping pipette
  - $1 \times Bunsen burner$
  - $1 \times heat proof mat$

access to a balance weighing to 1 decimal place or better wash bottle containing distilled water

paper towels

pen for labelling glassware

\*Candidates are expected to rinse and re-use 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 examination with Question 2.

**Chemicals Required** 

- It is especially important that great care is taken that the confidential information given below does not reach the candidates either directly or indirectly.
- 2 Particular requirements

| hazard             | label  | per<br>candidate                 | identity  | notes<br>(hazards given in this column are for the raw materials)  |
|--------------------|--|----------------------------------|---|--|
|                    | FA 1   | $2.5\pm0.1g$                     | anhydrous magnesium sulfate   | 2.5 $\pm$ 0.1 g anhydrous magnesium sulfate 2.5 $\pm$ 0.1 g freshly purchased MgSO <sub>4</sub> supplied in a stoppered tube.  |
| Check of used in a | on suitability of reaction of the section of the se | gent If the anl<br>several hours | <b>Check on suitability of reagent</b> If the anhydrous magnesium sulfate is not freshly purchas<br>used in an oven at 60 °C for several hours then cool in a desiccator or in stoppered bottles. | <b>Check on suitability of reagent</b> If the anhydrous magnesium sulfate is not freshly purchased, heat all the anhydrous magnesium sulfate to be used in an oven at 60 °C for several hours then cool in a desiccator or in stoppered bottles. |
|                    | FA 2   | 3.2 ±0.1 g                       | magnesium<br>sulfate-7-water  | $3.2 \pm 0.1$ g MgSO <sub>4</sub> .7H <sub>2</sub> O supplied in a stoppered tube.   |
|                    | FA 3   | 20 cm <sup>3</sup>               | 0.10 mol dm <sup>-3</sup> chromium(III)<br>chloride   | Dissolve 26.7 g CrC $l_3$ .6 $H_2$ O [H] in each dm <sup>3</sup> of solution.  |
|                    | FA 4   | 20 cm <sup>3</sup>               | 0.20 mol dm <sup>-3</sup> diammonium<br>iron(II) sulfate  | Dissolve 78.4 g (NH <sub>4</sub> ) <sub>2</sub> Fe(SO <sub>4</sub> ) <sub>2</sub> .6H <sub>2</sub> O [H] in 250 cm <sup>3</sup> 1.0 mol dm <sup>-3</sup> sulfuric acid [H] and make up to 1 dm <sup>3</sup> with distilled water.                |
| [N] [T]            | FA 5   | 20 cm <sup>3</sup>               | 0.10 mol dm <sup>-3</sup> lead(II) nitrate  | Dissolve 33.1 g Pb(NO $_3)_2$ [T] [N] in each dm $^3$ of solution.   |
|                    | distilled water  | 100 cm <sup>3</sup>              | distilled water   |  |





4

The reagents below should also be provided. Unless otherwise stated, each candidate should require no more than 10 cm<sup>3</sup> of any of these reagents. If necessary, they may be made available from a communal supply: however, the attention of the Invigilators should be drawn to the fact that such an arrangement may lead to contamination of reagents and enhance the opportunity for malpractice between candidates. ო

| [H]         dilute hydrochloric acid           [C]         dilute nitric acid           [H]         aqueous ammonia           [H]         aqueous ammonia           [H]         aqueous ammonia           [C]         aqueous ammonia           [H]         aqueous ammonia           [C]         aqueous ammonia           [H]         0.1 moldm <sup>-1</sup> barium nitrate           [H]         acidified aqueous potassium           [H]   | [H]         dilute hydrochloric acid           [C]         dilute nitric acid           [H]         dilute nitric acid           [H]         dilute nitric acid           [H]         aqueous ammonia           [H]         aqueous ammonia           [O]         aqueous ammonia           [C]         aqueous ammonia           [O]         aqueous anumonia           [P]         [D]           [P]         [D]           [I] N]         0.1 moldm <sup>-1</sup> barium nitrate           [H]         0.1 moldm <sup>-3</sup> barium nit   | Initial production and the hydrochloric acid       Initial hydrochloric acid         Initial production       30 cm <sup>3</sup> Initine       30 cm <sup>3</sup>   | hazard              | label   | quantity                        | notes   |
|--|--|---|---------------------|---|---------------------------------|---|
| ICJ       dilute nitric acid         IHJ       dilute sulfuric acid         IHJ       aqueous ammonia       30 cm <sup>3</sup> ICJ       aqueous ammonia       30 cm <sup>3</sup> ICJ       aqueous sodium hydroxide       30 cm <sup>3</sup> ICJ       aqueous sodium hydroxide       30 cm <sup>3</sup> ICJ       aqueous sodium hydroxide       30 cm <sup>3</sup> IPI       0.1 moldm <sup>-3</sup> barium chloride       30 cm <sup>3</sup> IT N       0.1 moldm <sup>-3</sup> silver nitrate       See identify details and preparation instructions on pages 68 and 69 of the         IT IN       0.1 moldm <sup>-3</sup> silver nitrate       Interate         IT IN       0.05 moldm <sup>-3</sup> silver nitrate       Interate         IT IN       0.1 moldm <sup>-3</sup> silver nitrate       Interate         IT IN       0.1 moldm <sup>-3</sup> silver nitrate       Interate         IT IN       0.1 moldm <sup>-3</sup> silver nitrate       Interate         IT IN       acidified aqueous potassium       Interate         IT IN <td< td=""><td>Icl       dilute nitric acid         IH       dilute suffuric acid         IH       dilute suffuric acid         IH       aqueous animonia         IH       aqueous animonia         IH       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         IN       0.1moldm<sup>-3</sup> barium chloride         IN       or         IN       0.05 moldm<sup>-3</sup> barium nitrate         II       or         II       0.05 moldm<sup>-3</sup> laad(II) nitrate         II       0.1 moldm<sup>-3</sup> laad(II) nitrate         II       0.1 moldm<sup>-3</sup> laad(II) nitrate         II       0.1 moldm<sup>-3</sup> laad(II) nitrate         II       1         acidified aqueous potassium         II       acidified</td><td>Icl       dilute nitric acid         IH       dilute suffaric acid         IH       dilute suffaric acid         IH       aqueous ammonia       <math>30  cm^3</math>         ICI       aqueous sodium hydroxide       <math>30  cm^3</math>         IH       0.1 moldm<sup>-1</sup> barium chloride       <math>30  cm^3</math>         IH       0.1 moldm<sup>-1</sup> barium chloride       <math>30  cm^3</math>         III       0.1 moldm<sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm<sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm<sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm<sup>-1</sup> barium nitrate       III       III         III       0.1 moldm<sup>-1</sup> barium nitrate       III         III       0.05 moldm<sup>-1</sup> barium nitrate       IIII         III       0.1 moldm<sup>-1</sup> barium nitrate       IIII         III       0.1 moldm<sup>-1</sup> barium nitrate       IIIII         III       0.1 moldm<sup>-1</sup> barium nitrate       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII</td><td>Ξ</td><td>dilute hydrochloric acid</td><td></td><td></td></td<> | Icl       dilute nitric acid         IH       dilute suffuric acid         IH       dilute suffuric acid         IH       aqueous animonia         IH       aqueous animonia         IH       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         ICI       aqueous animonia         IN       0.1moldm <sup>-3</sup> barium chloride         IN       or         IN       0.05 moldm <sup>-3</sup> barium nitrate         II       or         II       0.05 moldm <sup>-3</sup> laad(II) nitrate         II       0.1 moldm <sup>-3</sup> laad(II) nitrate         II       0.1 moldm <sup>-3</sup> laad(II) nitrate         II       0.1 moldm <sup>-3</sup> laad(II) nitrate         II       1         acidified aqueous potassium         II       acidified  | Icl       dilute nitric acid         IH       dilute suffaric acid         IH       dilute suffaric acid         IH       aqueous ammonia $30  cm^3$ ICI       aqueous sodium hydroxide $30  cm^3$ IH       0.1 moldm <sup>-1</sup> barium chloride $30  cm^3$ IH       0.1 moldm <sup>-1</sup> barium chloride $30  cm^3$ III       0.1 moldm <sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm <sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm <sup>-1</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         III       0.1 moldm <sup>-1</sup> barium nitrate       III       III         III       0.1 moldm <sup>-1</sup> barium nitrate       III         III       0.05 moldm <sup>-1</sup> barium nitrate       IIII         III       0.1 moldm <sup>-1</sup> barium nitrate       IIII         III       0.1 moldm <sup>-1</sup> barium nitrate       IIIII         III       0.1 moldm <sup>-1</sup> barium nitrate       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII   | Ξ                   | dilute hydrochloric acid  |                                 |   |
| [H]       dilute sulfuric acid         [H]       aqueous ammonia $30  \mathrm{cm}^3$ [C]       aqueous sodium hydroxide $30  \mathrm{cm}^3$ [C]       aqueous sodium hydroxide $30  \mathrm{cm}^3$ [H]       0.1 moldm <sup>-3</sup> barium chloride $30  \mathrm{cm}^3$ [H]       0.1 moldm <sup>-3</sup> barium chloride       See identity details and preparation instructions on pages 68 and 69 of the         [H] [N]       0.1 moldm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> barium silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> barium silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> barium silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         [H]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation ins   | Hit       dilute suffuric acid         Hit       aqueous ammonia $30  \mathrm{cm}^3$ Hit       aqueous sodium hydroxide $30  \mathrm{cm}^3$ Ici       aqueous sodium hydroxide $30  \mathrm{cm}^3$ Hit       0.1 moldm <sup>-3</sup> barium chloride       See identify details and preparation instructions on pages 68 and 69 of the         Hit       0.1 moldm <sup>-3</sup> barium nitrate       See identify details and preparation instructions on pages 68 and 69 of the         Hit       0.1 moldm <sup>-3</sup> silver nitrate       See identify details and preparation instructions on pages 68 and 69 of the         Hit       0.1 moldm <sup>-3</sup> silver nitrate       Antiperation instructions on pages 68 and 69 of the         Hit       0.1 moldm <sup>-3</sup> silver nitrate       Antiperation instructions on pages 68 and 69 of the         Hit       0.1 moldm <sup>-3</sup> silver nitrate       Antiperation instructions on pages 68 and 69 of the         TiN       0.1 moldm <sup>-3</sup> silver nitrate       Antiperation instructions on pages 68 and 69 of the         TiN       0.1 moldm <sup>-3</sup> silver nitrate       Antiperate       Antiperate         TiN       0.1 moldm <sup>-3</sup> silver nitrate       Antiperate       Antiperate         TiN       actidified aqueous potassium       Antiperate       Antiperate       Antiperate         TiN       actidified aqueous potassium       Antiperate   | [H]       dilute suffuric acid         [H]       aqueous ammonia       30 cm <sup>3</sup> [C]       aqueous sodium hydroxide       30 cm <sup>3</sup> [F]       0.1 mol dm <sup>-3</sup> barium chloride       30 cm <sup>3</sup> [H]       0.1 mol dm <sup>-3</sup> barium nitrate       30 cm <sup>3</sup> [H]       0.1 mol dm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the or 1 mol dm <sup>-3</sup> barium nitrate         [H]       0.1 mol dm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the or 1 mol dm <sup>-3</sup> barium nitrate         [H]       0.1 mol dm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the or 1 mol dm <sup>-3</sup> barium nitrate         [H]       0.1 mol dm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the or 1 mol dm <sup>-3</sup> barium nitrate         [H]       0.1 mol dm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the or 1 mol dm <sup>-3</sup> barium nitrate/11 mitrate         [H]       0.1 mol dm <sup>-3</sup> barium nitrate/11 nitrate       Interval         [H]       0.1 mol dm <sup>-3</sup> barium nitrate/11 nitrate       Interval         [H]       1 mitrate/11 nitrate       Interval         [H]       1 mitrate/11 nitrate       Interval         [H]       1 mol dm <sup>-3</sup> barot ano aparatus solid ba ava   | <u></u>             | dilute nitric acid  |                                 |   |
| [H]       aqueous ammonia       30 cm³         [C]       aqueous sodium hydroxide       30 cm³         [H]       0.1 mol dm³ barium chloride<br>or       30 cm³         [H]       0.1 mol dm³ barium nitrate<br>or       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.1 mol dm³ barium nitrate<br>or       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.0 mol dm³ barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.1 mol dm³ barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.0 mol dm³ barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.1 mol dm³ barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the 2013 syllatication         [H]       0.0.5 mol dm³ silver nitrate       See identity details and preparation         [H]       0.0.6 mol dm³ silver nitrate       See identity details and preparation         [H]       0.1 mol dm³ sadi       See identity details and preparate solid for testing nitrate/nitrite, wooden splints and preparate solid for testing for testing for testing for testing for testing for testing nitrate/nitrite, wooden splints and for testing for testing for testing for  | Image       adueous ammonia       30 cm <sup>3</sup> Image       adueous sodium hydroxide       30 cm <sup>3</sup> Image       adueous sodium hydroxide       30 cm <sup>3</sup> Image       0.1 moldm <sup>-3</sup> barium chloride       30 cm <sup>3</sup> Image       See identity details and preparation instructions on pages 68 and 69 of the         Image       0.1 moldm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         Image       0.1 moldm <sup>-3</sup> barium nitrate       See identity details and preparation instructions on pages 68 and 69 of the         Image       See identity details and preparation instructions on pages 68 and 69 of the       See identity details and preparation instructions on pages 68 and 69 of the         Image       O.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         Image       See identity details and preparation instructions on pages 68 and 69 of the       See identity details and preparation instructions on pages 68 and 69 of the         Image       See identity details and preparation instructions on pages 68 and 69 of the       See identity details and preparation instructions on pages 68 and 69 of the         Image       O.1 moldm <sup>-3</sup> silver nitrate       O.1 moldm <sup>-3</sup> silver nitrate       O.1 moldm <sup>-3</sup> silver nitrate         Image       O.1 moldm <sup>-3</sup> silver nit esting for carbon dioxide.       O.1 moldm <sup>-3</sup> silver | Image: | Ξ                   | dilute sulfuric acid  |                                 |   |
| [C]       aqueous sodium hydroxide $30  \mathrm{cm}^3$ [H]       0.1 moldm <sup>-3</sup> barium chloride<br>or $30  \mathrm{cm}^3$ [H]       0.1 moldm <sup>-3</sup> barium nitrate<br>or       See identity details and preparation instructions on pages 68 and 69 of the<br>or         [H] [N]       0.1 moldm <sup>-3</sup> silver nitrate<br>or       See identity details and preparation instructions on pages 68 and 69 of the<br>or         [H] [N]       0.05 moldm <sup>-3</sup> silver nitrate<br>[I]       Immodel<br>or       See identity details and preparation instructions on pages 68 and 69 of the<br>or         [H] [N]       0.05 moldm <sup>-3</sup> silver nitrate       See identity details and preparation<br>instructions on pages 68 and 69 of the<br>or         [H] [N]       0.05 moldm <sup>-3</sup> silver nitrate       See identity details and preparation<br>dictromate(VI)       See identity details and 69 of the<br>or         [H] [N]       0.1 moldm <sup>-3</sup> lead(II) nitrate       See identity details and preparative       See identity details and preparative         [H] [N]       0.1 moldm <sup>-3</sup> lead(II) nitrate       See identity details and preparative       See identity details and preparative         [H] [N]       0.1 moldm <sup>-3</sup> lead(II) nitrate       See identity details and preparative       See identity details and preparative         [H] [N]       0.1 moldm <sup>-3</sup> lead(II) nitrate       See identity details and preparative       See identity details and preparative         [H] [N]       0.1 moldm <sup>-3</sup> sinter stripe for use wit   | [C]aqueous sodium hydroxide $30  \mathrm{cm}^3$ [H]0.1 moldm <sup>-3</sup> barium chloride<br>o<br>0.1 moldm <sup>-3</sup> barium nitrateSee identity details and preparation instructions on pages 68 and 69 of the[H]0.1 moldm <sup>-3</sup> barium nitrateInstructions on pages 68 and 69 of the[H]0.05 moldm <sup>-3</sup> silver nitrateSee identity details and preparation instructions on pages 68 and 69 of the[T] [N]0.05 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]0.1 moldm <sup>-3</sup> laad(II) nitrateInstructions on pages 68 and 69 of the[T] [N]acidified aqueous potasiumInstructions on pages 68 and 69 of the[T] [N]acidified aqueous potasiumInstructions on pages 68 and 69 of the[T] [N]acidified aqueous potasiumInstructions on pages 68 and 69 of the[H]acidified aqueous potasiumInstructions on pages 68 and 69 of the[H]acidified aqueous potasiumInstructions on pages 68 and 69 of the  | Icl       aqueous sodium hydroxide $30  \mathrm{cm}^3$ IH       0.1 moldm <sup>-3</sup> barium chloride<br>or       See identify details and preparation instructions on pages 68 and 69 of the<br>or         H1 IN       0.1 moldm <sup>-3</sup> silver nitrate       See identify details and preparation instructions on pages 68 and 69 of the<br>or         H1 IN       0.05 moldm <sup>-3</sup> silver nitrate       See identify details and preparation instructions on pages 68 and 69 of the<br>or         H1 IN       0.1 moldm <sup>-3</sup> silver nitrate       See identify details and preparation         T1 IN       0.1 moldm <sup>-3</sup> silver nitrate         T1 IN       acidified aqueous potassium<br>dichromate(V1)         The following materials and apparatus should be available.         The following used in the Centre for use with dichromate(V1), aluminium foil for testing nitrate/nitrite, wooden         paratus normally used in the Centre for use with linewater in testing for carbon dioxide.   | Ξ                   | aqueous ammonia   | 30 cm <sup>3</sup>              |   |
| [H]0.1 mol dm-3 barium chloride<br>or<br>0.1 mol dm-3 barium nitrate<br>or<br>0.1 mol dm-3 barium nitrate<br>H] [N]See identity details and preparation instructions on pages 68 and 69 of the<br>See identity details and preparation instructions on pages 68 and 69 of the<br>See identity details and preparation instructions on pages 68 and 69 of the<br>O.1 mol dm-3 silver nitrate<br>T] [N]n] [N]0.05 mol dm-3 silver nitrate<br>I] [N]n] [N]0.1 mol dm-3 lead(II) nitrate<br>I] mewater<br>ilimewater<br>T] [N]n] [N]0.1 mol dm-3 lead(II) nitrate<br>ilimewater<br>infier aqueous potassium<br>dichromate(VI)n] [N]acidified aqueous potassium<br>dichromate(VI)n] filmacidified aqueous potassium<br>dichromate(VI)n] filmacidified aqueous potassium<br>dichromate(VI)acidified aqueous potassium<br>dichromate(VI)acidified aqueous potassium<br>dichromate(VI)n] ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden<br>to carbon dioxide.  | [H]       0.1 moldm <sup>-3</sup> barium chloride<br>or       See identity details and preparation instructions on pages 68 and 69 of the         H] [N]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         H] [N]       0.1 moldm <sup>-3</sup> silver nitrate       See identity details and preparation instructions on pages 68 and 69 of the         H] [N]       0.1 moldm <sup>-3</sup> silver nitrate       Imewater         [H]       0.1 moldm <sup>-3</sup> lead(II) nitrate         [H]       1 moldm <sup>-3</sup> lead(II) nitrate         [H]       acidified aqueous potassium         [I] [N]       acidified aq  | Image       0.1 moldm <sup>-3</sup> barium chloride<br>or<br>0.1 moldm <sup>-3</sup> barium nitrate<br>0.1 moldm <sup>-3</sup> barium nitrate<br>0.1 moldm <sup>-3</sup> silver nitrate<br>Image       See identity details and preparation instructions on pages 68 and 69 of the<br>solution of<br>0.1 moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate<br>Image       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       0.1 moldm <sup>-3</sup> silver nitrate       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       acidified aqueous potassium       Not moldm <sup>-3</sup> silver nitrate         Image       Image  | <u>כ</u>            | aqueous sodium hydroxide  | 30 cm <sup>3</sup>              |   |
| H] [N]       0.05 mol dm <sup>-3</sup> silver nitrate         T] [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [T] [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         T] [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         T] [N]       acidified aqueous potassium         T] [N]       acidified aqueous potassium         Th       following materials and apparatus should be available.         Ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden   | HJ [N]       0.05 moldm <sup>-3</sup> silver nitrate         TJ [N]       0.1 moldm <sup>-3</sup> lead(II) nitrate         [H]       0.1 moldm <sup>-3</sup> lead(II) nitrate         [H]       nimewater         [T] [N]       acidified aqueous potassium         TJ [N]       acidified aqueous potassium         TJ [N]       acidified aqueous potassium         Th       following materials and apparatus should be available.         Ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden ipparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | H) [N]       0.05 mol dm <sup>-3</sup> silver nitrate         T) [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [T] [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         T] [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         T] [N]       acidified aqueous potassium dictorate(VI)         T] [N]       acidified aqueous potassium dictorate(VI)         The following materials and apparatus should be available.         The following materials and apparatus should be available.         ed and blue littuus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden ipparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | Ξ                   | 0.1 mol dm <sup>-3</sup> barium chloride<br>or<br>0.1 mol dm <sup>-3</sup> barium nitrate | See iden                        | tity details and preparation instructions on pages 68 and 69 of the 2013 syllabus.  |
| TJ [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         TJ [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         TJ [N]       limewater         TJ [N]       acidified aqueous potassium         TJ [N]       acidified aqueous potassium         The following materials and apparatus should be available.       acidifier paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden apparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | TJ [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         TJ [N]       acidified aqueous potassium dichromate(VI)         TJ [N]       acidified aqueous potassium dichromate(VI)         The following materials and apparatus should be available.       acidifier paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden ipparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | TJ [N]       0.1 mol dm <sup>-3</sup> lead(II) nitrate         [H]       limewater         TJ [N]       acidified aqueous potassium         TJ [N]       acidified aqueous potassium         The following materials and apparatus should be available.       available.         The following materials and apparatus should be available.       and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden.         ed and blue litmus papers, plain filter paper strips for use with limewater in testing for carbon dioxide.       model   | [N] [H]             |   |                                 |   |
| Image: FH       Imewater         T [N]       acidified aqueous potassium dichromate(VI)         T [N]       acidified aqueous potassium dichromate(VI)         The following materials and apparatus should be available.       acidified aqueous potassium foil for testing nitrate/nitrite, wooden for the Centre for use with limewater in testing for carbon dioxide.  | HJ       limewater         TJ [N]       acidified aqueous potassium         Th [N]       acidified aqueous potassium         Ith following materials and apparatus should be available.       acidified aqueous potassium         The following materials and apparatus should be available.       acidified aqueous potassium         ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden ipparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | Induction       Immediate         TJ IN       acidified aqueous potassium         The following materials and apparatus       should be available.         The following materials and apparatus       should be available.         ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden.         pparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  |                     | 0.1 mol dm <sup>-3</sup> lead(II) nitrate   |                                 |   |
| TJ [N]       acidified aqueous potassium<br>dichromate(VI)         The following materials and apparatus should be available.       ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden in the Centre for use with limewater in testing for carbon dioxide.   | TJ [N]       acidified aqueous potassium         The following materials and apparatus should be available.       the following materials and apparatus should be available.         ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden apparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | TJ [N]       acidified aqueous potassium dichromate(VI)         The following materials and apparatus should be available.       The following materials and apparatus should be available.         ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden ipparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | E                   | limewater   |                                 |   |
| The following materials and apparatus should be available.<br>ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden<br>poparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | The following materials and apparatus should be available.<br>ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden pparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | The following materials and apparatus should be available.<br>ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden pparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | [N] [L]             | acidified aqueous potassium<br>dichromate(VI)   |                                 |   |
| ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden splints and fapparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  | ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden splints and the apparatus normally used in the Centre for use with limewater in testing for carbon dioxide.   | ed and blue litmus papers, plain filter paper strips for use with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden splints and the apparatus normally used in the Centre for use with limewater in testing for carbon dioxide.  |                     | following materials and apparatus s   | should be av                    |   |
|  |  | oridge.co   | red and<br>apparati | blue litmus papers, plain filter pape<br>us normally used in the Centre for u             | r strips for u<br>ise with lime | se with dichromate(VI), aluminium foil for testing nitrate/nitrite, wooden splints and the water in testing for carbon dioxide. |

# Responsibilities of the Supervisor during the Examination

www.papaCambridge.com 1 The Supervisor, or other competent chemist, must, out of sight of the candidates, carry experiments in Question 1 and complete tables of readings on a spare copy of the question which should be labelled 'Supervisor's Results'.

# This should be done for:

each session held and each laboratory used in that session, and each set of solutions supplied.

N.B. The question paper cover requests the candidate to fill in details of the examination session and the laboratory used for the examination.

It is essential that each packet of scripts contains a copy of the applicable Supervisor's Results as the candidates' work cannot be assessed accurately without such information.

The Supervisor must complete the Report Form on page 7 to show which candidates attended 2 each session. If all candidates took the examination in one session, please indicate this on the Report Form. A copy of the Report Form must accompany each copy of the Supervisor's Results in order for the candidates' work to be assessed accurately.

The Supervisor must give details on page 8 of any particular difficulties experienced by a candidate, especially if the Examiner would be unable to discover this from the written answers.

# After the Examination

# Each envelope returned to Cambridge must contain the following items.

- 1 The scripts of those candidates specified on the bar code label provided.
- 2 A copy of the Supervisor's Results relevant to the candidates in 1.
- 3 A copy of the Report Form, including details of any difficulties experienced by candidates (see pages 7 and 8).
- The Attendance Register. 4

#### 5 A Seating Plan for each session/laboratory.

Failure to provide appropriate documentation in each envelope may cause candidates to be penalised.

# COLOUR BLINDNESS

With regard to colour blindness – a minor handicap, relatively common in males – it is permissible to advise candidates who request assistance on colours of, for example, precipitates and solutions (especially titration end-points). Please include with the scripts a note of the candidate numbers of such candidates.

Experience suggests that candidates who are red/green colour-blind – the most common form – do not generally have significant difficulty. Reporting such cases with the scripts removes the need for a 'Special Consideration' application for this handicap.

| •  | 7 REPORT FORM is form must be completed and sent to the Examiner in the envelope with the scripts. entre number   |
|----|---|
|    | 7 · · · Papac   |
|    | REPORT FORM   |
| Th | is form must be completed and sent to the Examiner in the envelope with the scripts.  |
| Ce | entre number Name of Centre   |
| 1  | Supervisor's Results  |
|    | Please submit details of the readings obtained in <b>Question 1</b> on a spare copy of the question paper clearly marked 'Supervisor's Results' <b>and showing the Centre number and appropriate session/laboratory number.</b> |
| 2  | The candidate numbers of candidates attending each session were:  |
|    | First Session Second Session  |

- **3** The Supervisor is required to give details overleaf of any difficulties experienced by particular candidates, giving names and candidate numbers. These should include reference to:
  - (a) any general difficulties encountered in making preparation;
  - (b) difficulties due to faulty apparatus or materials;
  - (c) accidents to apparatus or materials;
  - (d) assistance with respect to colour blindness.

Other cases of hardship, e.g. illness, temporary disability, should be reported direct to CIE on the normal 'Application for Special Consideration' form.

4 A plan of work benches, giving details by candidate numbers of the places occupied by the candidates for each experiment for each session, must be enclosed with the scripts.

.....



Report on any difficulties experienced by candidates.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.