



Rewarding Learning

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education

Centre Number

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Candidate Number

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# Chemistry

## Assessment Unit AS 3

*assessing*

Module 3: Basic  
Practical Chemistry

### Practical Booklet A

[SCH31]

\*SCH31\*

### Assessment

#### TIME

1 hour 15 minutes.

#### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all** questions.

#### INFORMATION FOR CANDIDATES

The total mark for this paper is 25.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Periodic Table of the Elements (including some data) is provided.

**You may not have access to notes, textbooks and other material to assist you.**

**Safety glasses should be worn at all times and care should be taken during this practical examination.**

#### Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	



1 You are provided with:

- ethanol
- ethane-1,2-diol

(a) (i) Follow the procedure below.

**Step 1** Fill the burette with ethanol.

**Step 2** Run  $50.0 \text{ cm}^3$  of ethanol from the burette into a conical flask and record the time taken to the nearest second using a stopclock.

**Step 3** Repeat steps 1 and 2 using ethane-1,2-diol instead of ethanol.

**Step 4** Present your results in a suitable table below.

[3]

(ii) Calculate the flow rate of ethanol and ethane-1,2-diol in  $\text{cm}^3 \text{ s}^{-1}$ . Give your answers to one decimal place.

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[2]



(b) For the following tests, volumes are approximate and may be measured using graduated disposable pipettes.

**Record all observations.**

(i) Place 5 cm<sup>3</sup> of ethanol in a test tube and add 5 cm<sup>3</sup> of deionised water.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) Place 10 drops of ethanol on a watch glass and ignite using a burning splint.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(iii) Place 2 cm<sup>3</sup> of acidified potassium dichromate(VI) solution in a test tube and add 10 drops of ethanol. Place the mixture in a hot water bath.

\_\_\_\_\_  
\_\_\_\_\_ [1]

(iv) Place 2 cm<sup>3</sup> of ethanol in a test tube and add half a spatula-measure of phosphorus pentachloride in a fume cupboard.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [3]

[Turn over



2 You are provided with a sample of **X**.

- (a) Place the sample of **X** in a boiling tube and add  $5\text{ cm}^3$  of  $0.5\text{ mol dm}^{-3}$  sodium hydroxide solution. Heat gently in a Bunsen burner flame and test the gas evolved using damp universal indicator paper. Record all observations. **Keep the contents of the boiling tube for use in part (b). Allow it to cool for two minutes before carrying out part (b).**

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[3]

- (b) To the contents of the boiling tube from part (a), add  $5\text{ cm}^3$  of nitric acid followed by 5 drops of silver nitrate solution. Record your observations.

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[1]



3 You are provided with two metal salts labelled **A** and **B**.

(a) Describe the appearance of **A** and **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_ [2]

(b) Carry out the procedures below and record your observations.

(i) Dissolve the sample of **A** in approximately 20 cm<sup>3</sup> of deionised water in a 100 cm<sup>3</sup> beaker. Repeat this for **B** in a separate 100 cm<sup>3</sup> beaker.  
**Keep the solutions formed.**

**A** \_\_\_\_\_

**B** \_\_\_\_\_ [2]

(ii) Place 2 cm<sup>3</sup> of solution **A** in a test tube. Add 5 drops of 2.0 mol dm<sup>-3</sup> sodium hydroxide solution. Repeat this in a separate test tube for solution **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_ [2]

(iii) Place 2 cm<sup>3</sup> of potassium thiocyanate solution in a test tube. Add 1 drop of solution **A**. Repeat this in a separate test tube for solution **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_ [2]

(iv) Place 2 cm<sup>3</sup> of solution **A** in a test tube. Add 10 cm<sup>3</sup> of sodium carbonate solution. Repeat this in a separate test tube for solution **B**.

**A** \_\_\_\_\_

**B** \_\_\_\_\_ [2]



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**THIS IS THE END OF THE QUESTION PAPER**

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\*08SCH3106\*





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\*08SCH3108\*



## General Information

1 tonne =  $10^6$  g

1 metre =  $10^9$  nm

One mole of any gas at 293 K and a pressure of 1 atmosphere ( $10^5$  Pa) occupies a volume of 24 dm<sup>3</sup>

Avogadro Constant =  $6.02 \times 10^{23}$  mol<sup>-1</sup>

Planck Constant =  $6.63 \times 10^{-34}$  Js

Specific Heat Capacity of water =  $4.2 \text{ J g}^{-1} \text{ K}^{-1}$

Speed of Light =  $3 \times 10^8 \text{ ms}^{-1}$



## Characteristic absorptions in IR spectroscopy

Wavenumber/cm <sup>-1</sup>	Bond	Compound
550–850	C–X (X = Cl, Br, I)	Haloalkanes
750–1100	C–C	Alkanes, alkyl groups
1000–1300	C–O	Alcohols, esters, carboxylic acids
1450–1650	C=C	Arenes
1600–1700	C=C	Alkenes
1650–1800	C=O	Carboxylic acids, esters, aldehydes, ketones, amides, acyl chlorides
2200–2300	C≡N	Nitriles
2500–3200	O–H	Carboxylic acids
2750–2850	C–H	Aldehydes
2850–3000	C–H	Alkanes, alkyl groups, alkenes, arenes
3200–3600	O–H	Alcohols
3300–3500	N–H	Amines, amides

## Proton Chemical Shifts in Nuclear Magnetic Resonance Spectroscopy (relative to TMS)

Chemical Shift	Structure	
0.5–2.0	–CH	Saturated alkanes
0.5–5.5	–OH	Alcohols
1.0–3.0	–NH	Amines
2.0–3.0	–CO–CH	Ketones
	–N–CH	Amines
	C <sub>6</sub> H <sub>5</sub> –CH	Arene (aliphatic on ring)
2.0–4.0	X–CH	X = Cl or Br (3.0–4.0) X = I (2.0–3.0)
4.5–6.0	–C=CH	Alkenes
5.5–8.5	RCONH	Amides
6.0–8.0	–C <sub>6</sub> H <sub>5</sub>	Arenes (on ring)
9.0–10.0	–CHO	Aldehydes
10.0–12.0	–COOH	Carboxylic acids

These chemical shifts are concentration and temperature dependent and may be outside the ranges indicated above.

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# Data Leaflet

## Including the Periodic Table of the Elements

For the use of candidates taking  
Advanced Subsidiary and  
Advanced Level Examinations

**Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations**

# gce a/as examinations chemistry





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General Certificate of Education**

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## **Chemistry**

Assessment Unit AS 3

Basic Practical Chemistry

Practical Booklet A

[SCH31]

## **Assessment**

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# **APPARATUS AND MATERIALS LIST**

## Advice for centres

- All chemicals used should be at least laboratory reagent specification and labelled with appropriate safety symbols, e.g. irritant.
- For centres running multiple sessions – candidates for the later session should be supplied with clean, dry glassware. If it is not feasible, then glassware from the first session should be thoroughly washed, rinsed with deionised water and allowed to drain.
- Ensure all chemicals are in date otherwise expected observations may not be seen.
- It is the responsibility of the centre to be cognisant of all health and safety issues and to carry out a thorough risk assessment. Up to date information can be obtained at [www.cleapss.org.uk](http://www.cleapss.org.uk)

## Apparatus and Materials List

Each candidate must be supplied with safety goggles or glasses.

### Question 1

100 cm<sup>3</sup> of ethanol (IMS) labelled **ethanol** and **flammable**  
100 cm<sup>3</sup> of ethane-1,2-diol labelled **ethane-1,2-diol** and **flammable**  
2 × 250 cm<sup>3</sup> conical flasks  
2 × 250 cm<sup>3</sup> beakers  
1 × 50 cm<sup>3</sup> burette of at least class B quality  
1 × funnel for filling the burette  
1 × retort stand  
1 × burette clamp  
1 × wash bottle containing deionised water  
1 × stopclock  
4 × test tubes  
1 × test tube rack  
several disposable pipettes  
1 × splint  
access to a lit Bunsen burner  
1 × watch glass  
1 × heatproof mat  
access to a kettle of hot water  
1 × 250 cm<sup>3</sup> beaker (for water bath)  
1 × spatula  
access to phosphorus pentachloride labelled **phosphorus pentachloride** and **serious health hazard, corrosive** and **toxic** (in fume cupboard)  
10 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> potassium dichromate(VI) solution prepared in sulfuric acid labelled **acidified potassium dichromate(VI) solution** and **serious health hazard, corrosive** and **caution**

### Question 2

2 × 10 cm<sup>3</sup> measuring cylinders  
several disposable pipettes  
1 × boiling tube  
1 × boiling tube rack  
1 × boiling tube/test tube holder  
1 × Bunsen burner on a heatproof mat and method of lighting the Bunsen burner  
1 × piece of universal indicator paper pH 1-11  
1 × wash bottle containing deionised water (may be same from question 1)  
approximately 1 g of ammonium chloride in a sample bottle labelled **X**  
approximately 20 cm<sup>3</sup> of 0.5 mol dm<sup>-3</sup> sodium hydroxide solution labelled **0.5 mol dm<sup>-3</sup> sodium hydroxide solution (Q2)** and **corrosive**  
approximately 20 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> nitric acid labelled **nitric acid** and **corrosive**  
approximately 10 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> silver nitrate solution labelled **silver nitrate solution**

### Question 3

approximately 2.0 g of hydrated ammonium iron(II) sulfate in a sample bottle labelled **A**

approximately 2.0 g of hydrated iron(III) nitrate in a sample bottle labelled **B**

2 × 100 cm<sup>3</sup> beakers

1 × wash bottle containing deionised water (may be same from question 1)

1 × glass rod

6 × test tubes

1 × test tube rack

1 × 25 cm<sup>3</sup> measuring cylinder

1 × 10 cm<sup>3</sup> measuring cylinder

several disposable pipettes

approximately 10 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> sodium hydroxide solution labelled **2.0 mol dm<sup>-3</sup>**

**sodium hydroxide solution (Q3) and corrosive**

approximately 10 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> **potassium thiocyanate solution** labelled **potassium**

**thiocyanate solution**

approximately 50 cm<sup>3</sup> of 0.2 mol dm<sup>-3</sup> sodium carbonate solution labelled **sodium carbonate solution**