

New  
Specification



Rewarding Learning

ADVANCED SUBSIDIARY (AS)  
General Certificate of Education  
2017

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\*

**WEDNESDAY 3 MAY, MORNING**

## 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 three** 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 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.**

10924



\*08SCH3101\*

1 You are provided with four solutions labelled **A**, **B**, **C** and **D**.

(a) Describe the appearance of the solutions.

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

(b) Give observations obtained when the procedures listed below are performed.

(i) Mix  $2\text{ cm}^3$  of **A** with  $2\text{ cm}^3$  of **B** in a test tube.

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

(ii) Mix  $2\text{ cm}^3$  of **A** with  $2\text{ cm}^3$  of **C** in a test tube.

\_\_\_\_\_  
\_\_\_\_\_ [2]

(iii) Mix  $2\text{ cm}^3$  of **A** with  $2\text{ cm}^3$  of **D** in a test tube.

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

(iv) Mix  $2\text{ cm}^3$  of **B** with  $2\text{ cm}^3$  of **C** in a test tube.

\_\_\_\_\_  
\_\_\_\_\_ [2]





(v) Mix  $2\text{ cm}^3$  of **B** with  $2\text{ cm}^3$  of **D** in a test tube.

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[1]

(vi) Mix  $2\text{ cm}^3$  of **C** with  $2\text{ cm}^3$  of **D** in a test tube.

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[2]

[Turn over



- 2 (a) You are required to react hydrochloric acid of unknown concentration with standard  $2.0 \text{ mol dm}^{-3}$  sodium hydroxide solution.

You are provided with:

hydrochloric acid of unknown concentration  
 $2.0 \text{ mol dm}^{-3}$  sodium hydroxide solution  
a thermometer

- Rinse out a burette with the hydrochloric acid.
- Fill the burette with the hydrochloric acid.
- Rinse out a pipette with the sodium hydroxide solution.
- Using the pipette and a pipette filler, place  $25.0 \text{ cm}^3$  of the sodium hydroxide solution in a polystyrene cup in a beaker.
- Measure and record the temperature of the sodium hydroxide solution.
- Add  $5.0 \text{ cm}^3$  of hydrochloric acid from the burette to the sodium hydroxide solution, stir and record the temperature in a suitable table.
- Continue adding  $5.0 \text{ cm}^3$  portions and recording the temperature, until  $40.0 \text{ cm}^3$  of hydrochloric acid solution has been added.
- Repeat the complete experiment to obtain a mean temperature.
- Present your results in a suitable table in the space below.

[4]

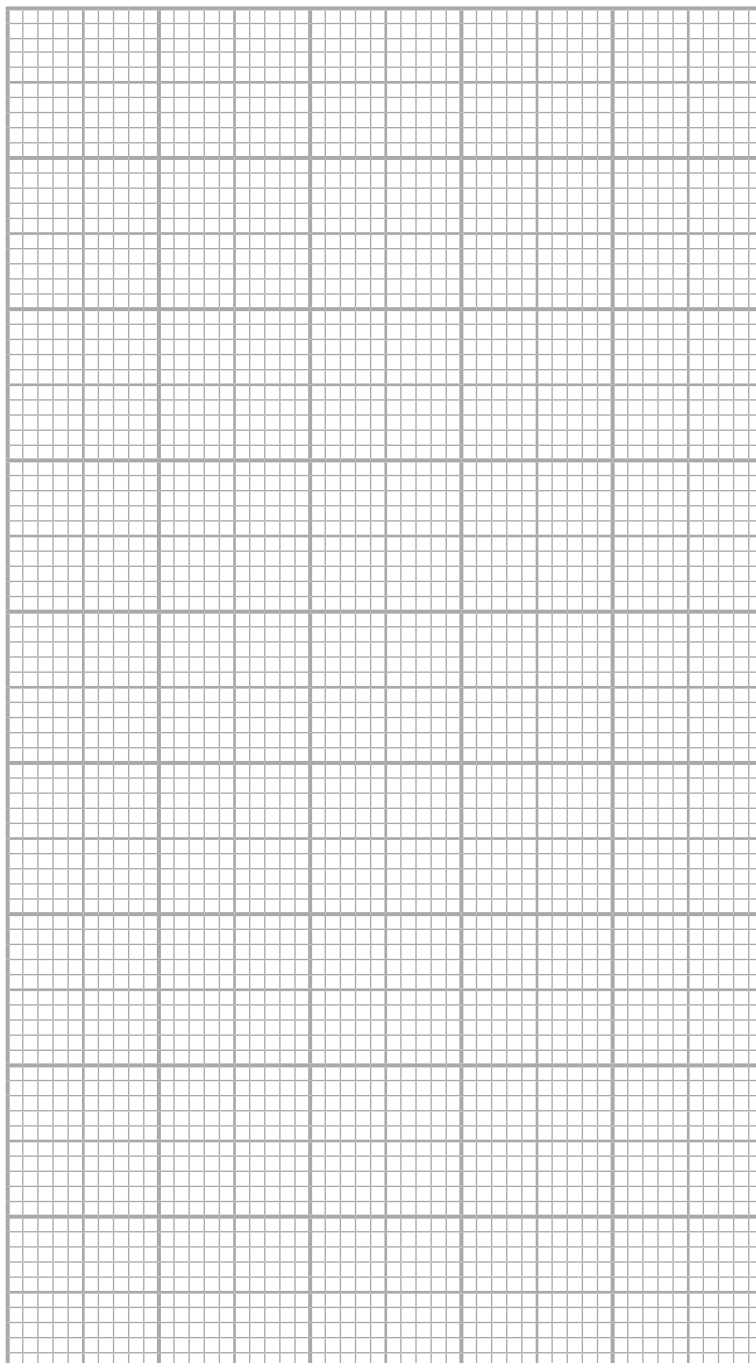


(b) (i) Label the axes on the graph, including the units.

[1]

(ii) Plot a graph of mean temperature against volume of hydrochloric acid added.

[2]



3 You are provided with three unknown liquids labelled **E**, **F** and **G**. Without using any other reagents, give observations for each of the following procedures.

(a) Describe the smell of each of the liquids.

(i) **E** \_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) **F** \_\_\_\_\_  
\_\_\_\_\_ [1]

(iii) **G** \_\_\_\_\_  
\_\_\_\_\_ [1]

(b) (i) Mix  $2\text{ cm}^3$  of **E** with  $2\text{ cm}^3$  of **F** in a test tube.

\_\_\_\_\_

(ii) Mix  $2\text{ cm}^3$  of **E** with  $2\text{ cm}^3$  of **G** in a test tube.

\_\_\_\_\_

(iii) Mix  $2\text{ cm}^3$  of **F** with  $2\text{ cm}^3$  of **G** in a test tube.

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



(c) Place 2 drops of **F** and **G** on different watch glasses and ignite using a burning splint.

(i) **F** \_\_\_\_\_ [1]

(ii) **G** \_\_\_\_\_ [1]

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

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**DO NOT WRITE ON THIS PAGE**

Question Number	Marks	
	Examiner Mark	Remark
1		
2		
3		
<b>Total Marks</b>		

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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 =  $6.63 \times 10^{-34}$  J s  
 Specific Heat Capacity of water =  $4.2$  J g<sup>-1</sup> K<sup>-1</sup>  
 Speed of Light =  $3 \times 10^8$  m s<sup>-1</sup>

## 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	Compound
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.

# GCE

## CHEMISTRY DATA SHEET GCE A/AS EXAMINATIONS CHEMISTRY

### Including the Periodic Table of the Elements

For the use of candidates taking  
Advanced Subsidiary and Advanced Level  
Chemistry 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.**

# THE PERIODIC TABLE OF ELEMENTS

## Group

	I	II											III	IV	V	VI	VII	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 <b>H</b> Hydrogen 1													4 <b>He</b> Helium 2					
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12											27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18	
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36	
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	98 <b>Tc</b> Technetium 43	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54	
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> <sup>*</sup> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	186 <b>Re</b> Rhenium 75	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	222 <b>Rn</b> Radon 86	
223 <b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88	227 <b>Ac</b> <sup>†</sup> Actinium 89	261 <b>Rf</b> Rutherfordium 104	262 <b>Db</b> Dubnium 105	266 <b>Sg</b> Seaborgium 106	264 <b>Bh</b> Bohrium 107	277 <b>Hs</b> Hassium 108	268 <b>Mt</b> Meitnerium 109	271 <b>Ds</b> Darmstadtium 110	272 <b>Rg</b> Roentgenium 111	285 <b>Cn</b> Copernicium 112							

\* 58–71 Lanthanum series

† 90–103 Actinium series

$\begin{matrix} a \\ b \end{matrix}^x$	a = relative atomic mass (approx) x = atomic symbol b = atomic number
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140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	145 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
232 <b>Th</b> Thorium 90	231 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	237 <b>Np</b> Neptunium 93	242 <b>Pu</b> Plutonium 94	243 <b>Am</b> Americium 95	247 <b>Cm</b> Curium 96	245 <b>Bk</b> Berkelium 97	251 <b>Cf</b> Californium 98	254 <b>Es</b> Einsteinium 99	253 <b>Fm</b> Fermium 100	256 <b>Md</b> Mendelevium 101	254 <b>No</b> Nobelium 102	257 <b>Lr</b> Lawrencium 103

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**2017**

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# **Chemistry**

Assessment Unit AS 3

Basic Practical Chemistry

Practical Booklet A

**[SCH31]**

**WEDNESDAY 3 MAY, MORNING**

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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)

## Practical Examination

Each candidate must be supplied with safety goggles or glasses.

Please note no other reagents or means of identifying solutions should be provided to students other than those provided in this list. Items such as pH paper are not permitted.

Each candidate must be supplied with:

- 15 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> potassium carbonate solution labelled **A**
- 15 cm<sup>3</sup> of 2 mol dm<sup>-3</sup> hydrochloric acid labelled **B**
- 15 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> silver nitrate solution labelled **C**, this should be stored in a dark bottle and dispensed as close to the examination as possible
- 15 cm<sup>3</sup> of 0.1 mol dm<sup>-3</sup> potassium iodide solution labelled **D**, this should be prepared as close to the examination as possible, not more than one day before
- 6 test tubes
- Test tube rack
- Test tube holder
- At least 6 dropping pipettes
- 10 cm<sup>3</sup> measuring cylinder
- 250 cm<sup>3</sup> beaker
- Two 100 cm<sup>3</sup> beakers
- Thermometer graduated in 1°C intervals
- 100 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> sodium hydroxide solution, labelled **sodium hydroxide solution 2.0 mol dm<sup>-3</sup>** and **corrosive**
- 100 cm<sup>3</sup> of 2.0 mol dm<sup>-3</sup> hydrochloric acid, labelled **hydrochloric acid** and **corrosive**
- One 50 cm<sup>3</sup> burette of at least class B quality
- A funnel for filling the burette
- A retort stand and clamp
- One beaker for waste solution
- Three polystyrene cups
- One 25 cm<sup>3</sup> pipette of at least class B quality
- A wash bottle containing deionised water

- Safety pipette filler
- 10 cm<sup>3</sup> of deionised water labelled **E**
- 10 cm<sup>3</sup> ethanol (industrial alcohol) labelled **F**
- 10 cm<sup>3</sup> cyclohexane labelled **G** in a sealed container
- Beaker placed in fume cupboard labelled **waste residues containing G**
- Three watch glasses
- Three wooden splints
- Bunsen burner

**Supervisor should direct candidates to place residues containing G into a beaker in the fume cupboard immediately after use**