



Rewarding Learning

General Certificate of Secondary Education
2022

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Chemistry

Unit 3: Practical Skills

Booklet A

Foundation Tier



GCM31

[GCM31]

TIME

2 hours.

INSTRUCTIONS TO CANDIDATES

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

Write your answers in the spaces provided in this question paper.

Answer **all** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **30**.

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

Follow all health and safety instructions.

You may use a ruler and calculator if required.

The apparatus and materials required to complete the task(s) are provided.

A Data Leaflet, which includes a Periodic Table of the Elements, is included in this question paper.

For Examiner's
use only

Question Number	Marks
1	
2	

Total
Marks

--

1 (a) Describe the appearance of hydrated copper(II) sulfate.

[2]

(b) (i) Follow the procedure below. Mass measurements should be recorded in **Table 1** and observations in **Table 2**.

1. Weigh an empty evaporating basin and record the mass.
2. Keep the evaporating basin on the balance and add between 4.0 g and 5.0 g of hydrated copper(II) sulfate into the evaporating basin.
3. Record the mass of the evaporating basin and hydrated copper(II) sulfate.
4. Place the evaporating basin containing the hydrated copper(II) sulfate on a gauze on a tripod over a Bunsen burner.
5. Heat the evaporating basin and its contents **gently** over a Bunsen burner flame for 5 minutes. Record the observations made.
6. Allow the evaporating basin and contents to cool for 5 minutes.
7. Reweigh the evaporating basin and its contents and record the mass.

Table 1

Mass measurements	Mass/g
Mass of empty evaporating basin	
Mass of evaporating basin and hydrated copper(II) sulfate	
Mass of evaporating basin and contents after heating for 5 minutes	

Table 2

Observations made during the heating of hydrated copper(II) sulfate	
---	--

[5]

(ii) Calculate the loss in mass as a result of heating.

[2]

- 2 (a) You are provided with 2.5 mol/dm^3 hydrochloric acid. Describe the appearance of the hydrochloric acid.

[2]

- (b) Follow the procedure below.

1. Fill a burette with the hydrochloric acid labelled **2.5 mol/dm^3 hydrochloric acid**.
2. Fill a second burette with deionised water.
3. Measure and cut 4 pieces of magnesium ribbon each 2 cm long.
4. Measure 20.0 cm^3 of 2.5 mol/dm^3 hydrochloric acid from the burette into a boiling tube. Return the boiling tube to the boiling tube rack.
5. Add one 2 cm piece of magnesium ribbon to the hydrochloric acid in the boiling tube and immediately start the stopclock.
6. Stop the stopclock when the magnesium ribbon has disappeared and record the time taken **to the nearest second** in the results table below.
7. Measure 16.0 cm^3 of 2.5 mol/dm^3 hydrochloric acid using the burette and place in a clean boiling tube. Add 4.0 cm^3 of deionised water from the second burette to the boiling tube and stir with a glass rod to mix. Return the boiling tube to the boiling tube rack.
8. Add one 2 cm piece of magnesium ribbon to the boiling tube and immediately start the stopclock.
9. Stop the stopclock when the magnesium ribbon has disappeared and record the time taken **to the nearest second** in the results table below.
10. Repeat steps 7–9 for the remaining volumes of hydrochloric acid and deionised water shown in the table below. Refill the burettes if necessary.

Volume of hydrochloric acid/ cm^3	Volume of deionised water/ cm^3	Concentration/ mol/dm^3	Time taken for Mg to disappear/s
20.0	0.0	2.5	
16.0	4.0	2.0	
12.0	8.0	1.5	
8.0	12.0	1.0	

[2]

Examiner Only

Marks Remark

Permission to reproduce all copyright material has been applied for.
In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA
will be happy to rectify any omissions of acknowledgement in future if notified.

SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Butanoate	$\text{C}_3\text{H}_7\text{COO}^-$
Carbonate	CO_3^{2-}
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogencarbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	HCOO^-
Nitrate	NO_3^-
Propanoate	$\text{C}_2\text{H}_5\text{COO}^-$
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

Data Leaflet

Including the Periodic Table of the Elements

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

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

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble
Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

gcse examinations chemistry

Group

1	H	Hydrogen	1
---	---	----------	---



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



Rewarding Learning

**General Certificate of Secondary Education
2022**

Chemistry

Unit 3: Practical Skills

Booklet A

Foundation Tier

[GCM31]

APPARATUS AND MATERIALS LIST AND CONFIDENTIAL INSTRUCTIONS

To be accessed by Head of Department only

It is the responsibility of the centre to ensure that appropriate risk assessments are carried out for all practical skills assessments.

Question 1

- Access to an electronic balance (capable of reading to 2 decimal places)
- Evaporating basin
- Spatula
- Heatproof mat
- Tripod
- Gauze
- Bunsen burner
- Tongs suitable for lifting an evaporating basin
- Stopclock/timer
- 1 × 100 cm³ beaker
- Glass rod
- 4 × boiling tubes
- 1 × rubber bung to fit boiling tube
- 1 × boiling tube rack
- Labels or pen for writing on glass (to label boiling tubes as **1**, **2**, **3** and **4**) or other suitable method for labelling
- 1 × 25 cm³ measuring cylinder
- 1 × 10 cm³ measuring cylinder
- Several disposable pipettes
- Deionised water in a wash bottle

Approximately 8g of hydrated copper(II) sulfate in a suitable container labelled **hydrated copper(II) sulfate** and also with the hazard label for health hazard (exclamation mark label).

20 cm³ of just less than 0.5 mol/dm³ sodium hydroxide solution in a suitable container labelled **sodium hydroxide solution** and with the hazard label for health hazard (exclamation mark label).

20 cm³ of 0.5 mol/dm³ ammonia solution in a suitable container and labelled **ammonia solution** and with the hazard label for health hazard (exclamation mark label).

10 cm³ of 0.1 mol/dm³ barium chloride solution in a suitable container and labelled **barium chloride solution** and with the hazard label for health hazard (exclamation mark label).

1 × 2 cm strip of magnesium ribbon labelled **magnesium ribbon for use in Question 1** and with the hazard label for flammable.

Question 2

- 1 × 50 cm³ burette labelled **2.5 mol/dm³ hydrochloric acid**
- 1 × 50 cm³ burette labelled **deionised water**
- 2 × burette clamps
- 2 × retort stands
- 2 × filter funnels for filling the burettes
- 4 × boiling tubes
- 1 × boiling tube rack
- Glass rod
- Stopclock/timer
- Scissors
- Ruler
- 2 × 250 cm³ beaker (waste beakers for burettes)

100 cm³ of approximately 2.5 mol/dm³ hydrochloric acid labelled **2.5 mol/dm³ hydrochloric acid** and with the hazard label for health hazard (exclamation mark label).

100 cm³ of deionised water labelled **deionised water** (or access to deionised water in the laboratory with a suitable labelled beaker)

Approximately 10 cm of magnesium ribbon labelled **magnesium ribbon for use in Question 2** and with the hazard label for flammable.