



Rewarding Learning

General Certificate of Secondary Education
2019

Centre Number

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Candidate Number

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Single Award Science

Unit 4

Booklet A

Foundation Tier

[GSA41]

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	
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Task 1

- 1 When a metal is added to an acid, there is a change in temperature. To investigate this, you are provided with three samples of metal filings (zinc, magnesium and iron) and hydrochloric acid.

(a) Carry out the procedure below and record your results in the table provided.

1. Use a measuring cylinder to measure 25 cm³ of hydrochloric acid.
2. Pour the hydrochloric acid into the polystyrene cup which is inside a beaker.
3. Measure and record the initial temperature of the acid.
4. Add two level spatulas of zinc filings to the acid.
5. Stir the acid and metal gently.
6. Measure and record the highest temperature reached by the acid. (You are advised not to wait longer than 5 minutes.)
7. Repeat steps 1–6 for the magnesium and then the iron filings.
8. Complete the table by calculating the change in temperature.

A result for aluminium is already provided.

Metal	Initial temperature/°C	Highest temperature/°C	Change in temperature/°C
Aluminium	18	24	6
Zinc			
Magnesium			
Iron			

[2]

(b) When carrying out a scientific investigation risks or hazards need to be identified and steps taken to minimise any danger.

(i) For this investigation state **one** possible risk or hazard.

_____ [1]

(ii) Describe **one** thing you did to minimise the danger.

_____ [1]

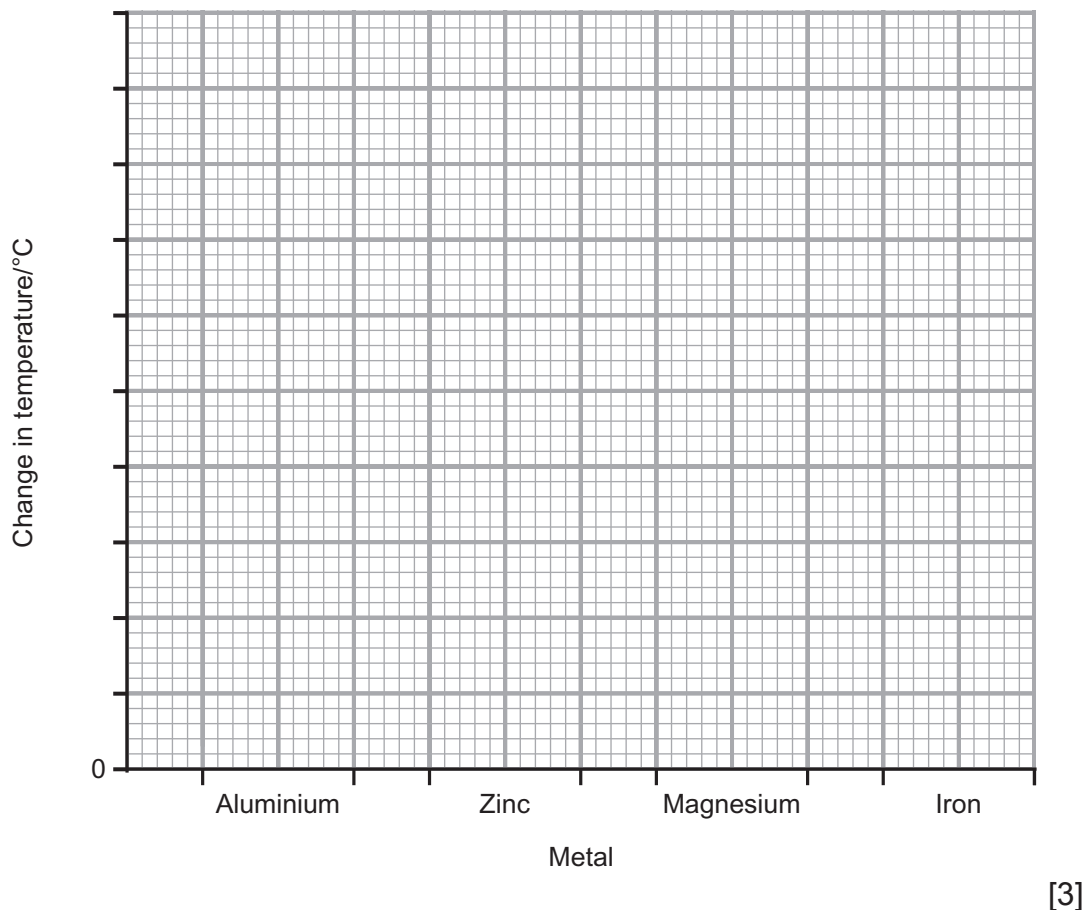
Examiner Only

Marks Remark

(c) (i) What affect did adding the metal have on the temperature of the acid?

[1]

(ii) Use the results to draw a **bar chart** on the grid below. You will need to add a suitable scale on the vertical axis (change in temperature).



(iii) Use **your** results to place the metals (**zinc, magnesium and iron**) in order of increasing reactivity.

_____ least reactive

 _____ most reactive [1]

(iv) State **one** thing you could have done to increase the **reliability** of the results of this investigation.

[1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

The current through a wire is directly proportional to the voltage across the wire, provided the temperature remains constant.

variable power supply

A

V

resistance wire

1. Make sure the power supply is switched off.
2. Set the power supply to 2 V.
3. Switch on the power supply.
4. Use the table below to record the voltage and current shown by each **meter**. Record your results to **one** decimal place.
5. Switch off the power supply for one minute.
6. Turn the power supply to a higher value and repeat steps 3, 4 and 5. Collect five sets of results at different voltages.

Voltage/V	Current/A
0.0	0.0

[Turn over

(b) (i) Name the meter that is connected in **series** with the resistance wire.

_____ [1]

(ii) Name the unit of current.

_____ [1]

(iii) State **one** risk when carrying out this experiment. Describe how you minimised this risk.

_____ [2]

(iv) Apart from temperature, suggest **one** thing that was kept the same for the resistance wire, to make sure this was a fair test.

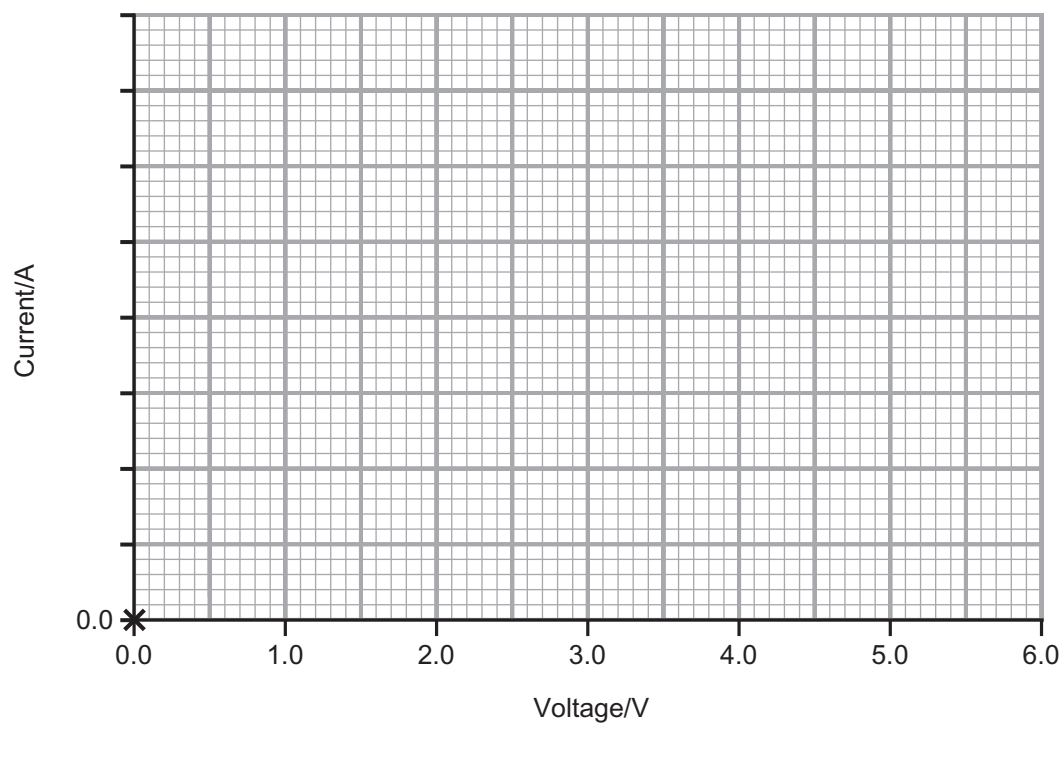
_____ [1]

Examiner Only	
Marks	Remark

(c) (i) Use the grid below to plot a **line** graph of your results.

Make sure that you:

- add a suitable scale to the vertical axis (current)
- plot your results
- draw a line of best fit.



(ii) State the trend shown by your results.

[1]

(iii) Are there any anomalous results in your investigation?
Explain your answer.

[1]

Examiner Only	
Marks	Remark

Circle the correct answer.

[1]

 [1]

12234

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

THE PERIODIC TABLE OF ELEMENTS
Group

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

1

H

Hydrogen

1

* 58 – 71 Lanthanum series
† 90 – 103 Actinium series

a

X

b

a = relative atomic mass (approx)

x = atomic symbol

b = atomic number

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