



Rewarding Learning

General Certificate of Secondary Education
2023

Centre Number

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Candidate Number

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Double Award Science: Chemistry

Unit 7 Practical Skills
Booklet B
Foundation Tier



[GDW73]
TUESDAY 13 JUNE, MORNING

GDW73

TIME

30 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 four** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 35.

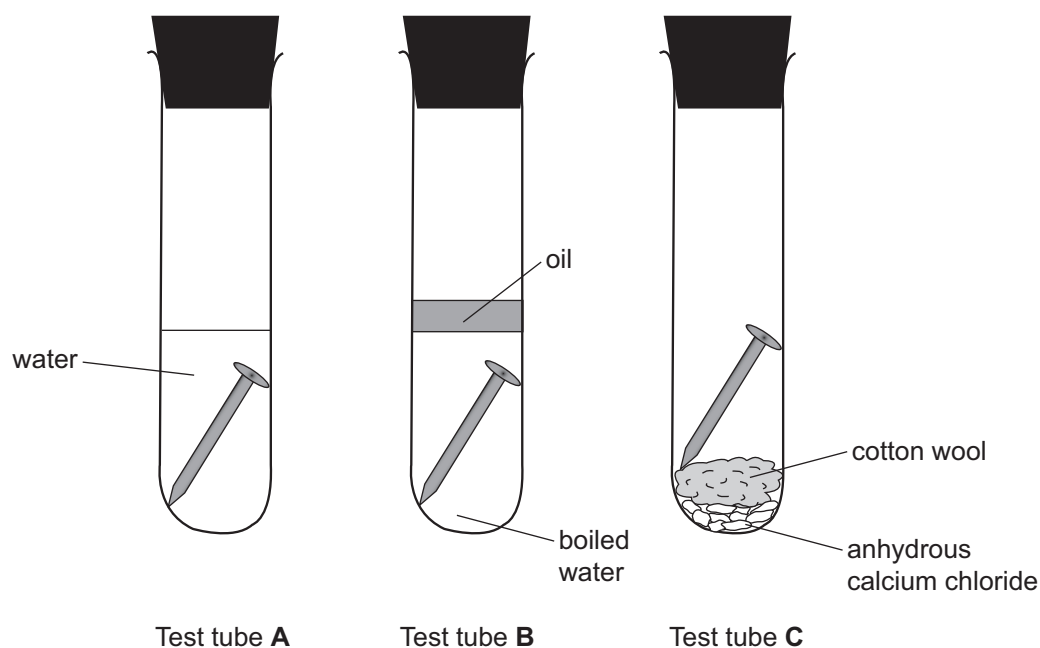
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet including a Periodic Table of the Elements is provided.

Quality of written communication will be assessed in Question **2(b)**.



- 1 (a) The process of rusting can be investigated experimentally. The following experiment was set up by placing iron nails in test tubes under different conditions.



- (i) The test tubes were left for a week. In which test tube (**A**, **B** or **C**) did the nail rust?

_____ [1]

- (ii) State the **two** conditions required for iron to rust.

1. _____
2. _____ [2]

- (iii) Explain why the water in test tube **B** had been boiled.

_____ [1]



(iv) What is the purpose of the anhydrous calcium chloride in test tube **C**?

_____ [1]

(v) Fill the blank space below to give the full chemical name for rust.

hydrated iron(III) _____ [1]

(vi) Describe the appearance of rust.

_____ [2]

(b) Rusting is an example of an oxidation reaction. Which **two** of the following statements are definitions for oxidation? Place a tick (✓) in the right-hand box for each correct statement.

loss of oxygen	☐
gain of oxygen	☐
loss of hydrogen	☐
gain of hydrogen	☐

[2]

(c) State **two** methods used to prevent iron from rusting.

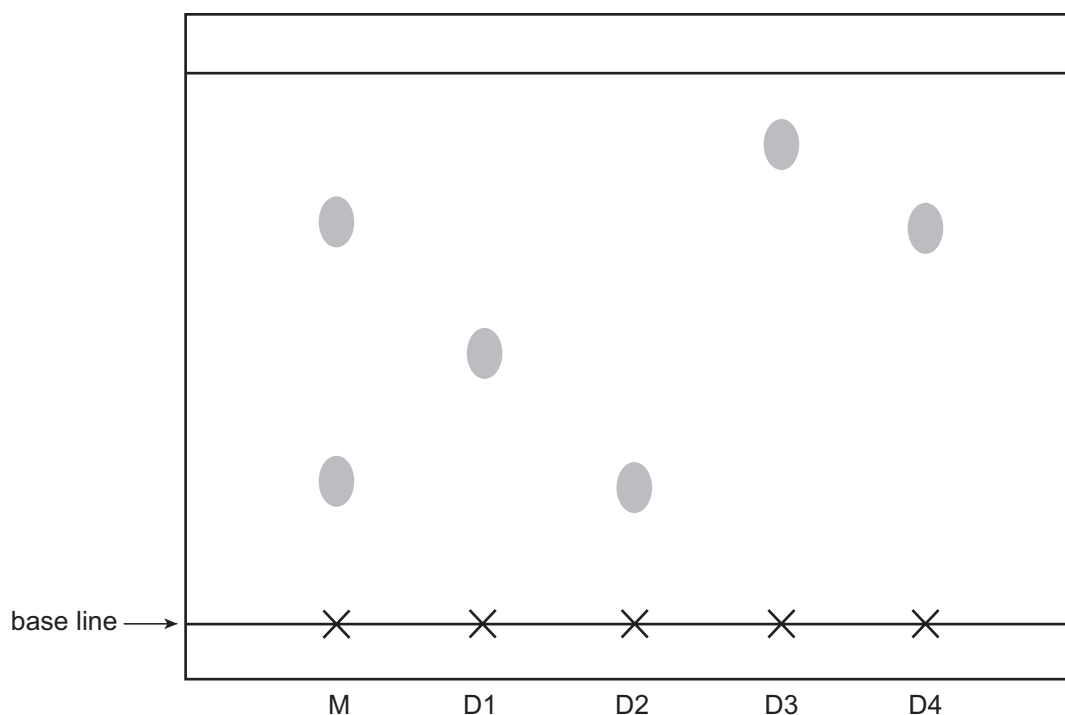
1. _____

2. _____ [2]

[Turn over]



- 2 The results of a paper chromatography experiment involving a mixture of dyes (labelled M) and four pure dyes (labelled D1, D2, D3 and D4) are shown below.



- (a) (i) What is the stationary phase in paper chromatography?

_____ [1]

- (ii) Label the **solvent front** on the chromatogram above.

[1]

- (iii) Identify which pure dyes are present in the mixture of dyes, M.

_____ [1]

- (iv) Which one of the pure dyes (D1, D2, D3 or D4) is the **least** soluble in the solvent? Give a reason for your answer.

Dye: _____

Reason: _____

_____ [2]



(b) Describe how a student can carry out an experiment to achieve the results shown in the chromatogram.

In your answer you should describe:

- how to prepare the chromatography paper
- how the chromatography experiment is carried out
- when the experiment should be stopped and how this is achieved.

In your answer you will be assessed on the quality of written communication including the use of specialist scientific terms.

How to prepare the chromatography paper:

How the chromatography experiment is carried out:

[Turn over



[6]

13915





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(Questions continue overleaf)

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[Turn over



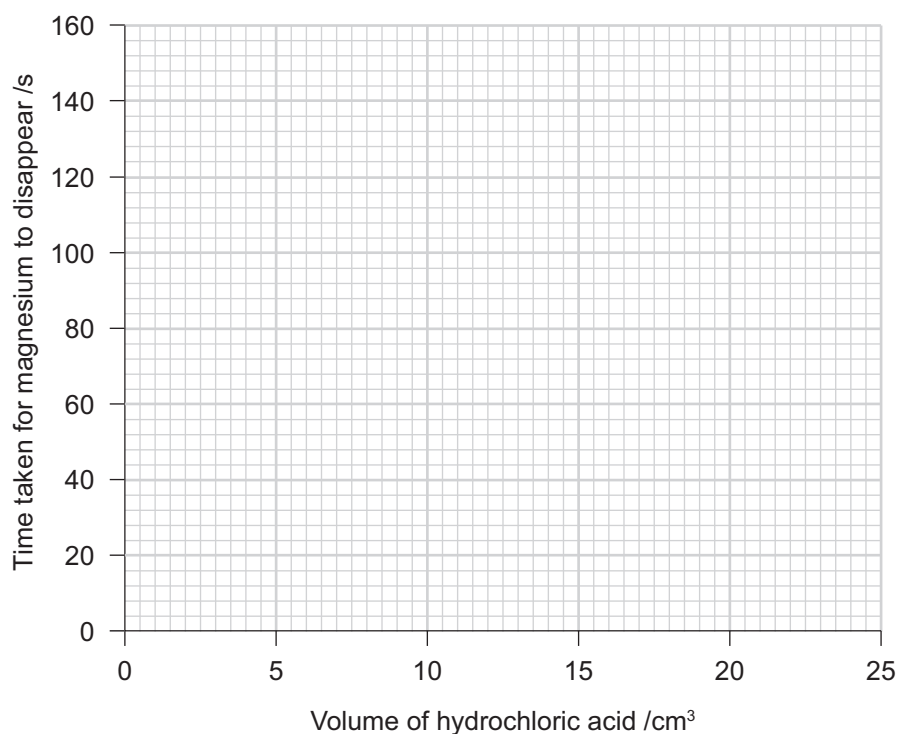
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- 3 A series of five experiments was carried out using magnesium and hydrochloric acid. The acid was diluted as shown in the table to obtain five different concentrations. A strip of magnesium ribbon was added to the acid and the time taken for the magnesium to disappear was recorded.

The results obtained are given in the table below.

Experiment	Volume of hydrochloric acid /cm ³	Volume of deionised water /cm ³	Time taken for magnesium to disappear /s
1	5	20	140
2	10	15	80
3	15	10	50
4	20	5	40
5	25	0	36

- (a) On the axes below, plot a graph to show how the time taken for the magnesium to disappear changes as the volume of hydrochloric acid changes. Draw a curve through the points.



[4]



(b) Using the graph you have drawn in **(a)**, answer the questions below.

- (i)** How does the time taken for the magnesium to disappear change as the volume of hydrochloric acid increases?

Circle the correct answer.

decreases

increases

no change

[1]

- (ii)** What is the time taken for the magnesium to disappear when the volume of hydrochloric acid is 13 cm^3 ?

_____ s [1]

- (c)** Complete the word equation for the reaction between magnesium and hydrochloric acid.

magnesium + hydrochloric acid → _____ + _____

[2]

[Turn over]



4 Chemical tests often involve colour changes.

(a) Indicators are substances that may change colour when they are used to test acidic or alkaline solutions.

(i) State the colour observed when universal indicator is added to a solution of hydrochloric acid.

_____ [1]

(ii) State the colour observed when sodium hydroxide solution is tested using red litmus paper.

_____ [1]

(b) What colour change is observed when water is added to anhydrous copper(II) sulfate?

From _____ to _____ [2]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	

Total Marks	
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Examiner Number

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