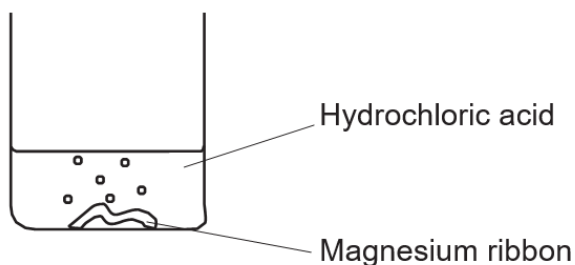


GCSE Chemistry A (Gateway Science)
J248/04 Chemistry A C4-C6 and C7 (Higher Tier)

Question Set 7

1 A student investigates the reaction between magnesium and dilute hydrochloric acid, HCl.

The student adds magnesium ribbon to hydrochloric acid in a beaker, as shown in the diagram.



(a) Write the **balanced symbol** equation for this reaction. [2]

(b)* The student measures the time it takes for all the magnesium to react. This is the reaction time.

The student does five experiments. This is the student's prediction:

“The smaller the volume of acid and the greater the concentration of acid, the faster the reaction rate.”

Look at the student's results.

Experiment	Mass of magnesium used (g)	Volume of acid used (cm ³)	Concentration of acid (mol/dm ³)	Reaction time (s)
1	0.05	25	1.0	30
2	0.05	50	1.0	30
3	0.05	50	2.0	15
4	0.10	25	1.0	30
5	0.10	50	2.0	15

Describe and explain whether the student's results support his prediction.

Include ideas about the reacting particle model in your answer.

(c) The student repeats experiment 1. This time he uses acid at a **higher** temperature.

Explain, using the reacting particle model, **what happens to the rate of reaction** and **predict the reaction time** for this reaction.

[6]

[3]

- (d) Another student investigates the reaction between marble chips and hydrochloric acid.

She times how long it takes for all the marble chips to react.

Look at her results.

Experiment	Size of marble chips	Reaction time (s)	Mean rate of reaction (g/s)
1	large	240	8.33×10^{-4}
2	large	120	
3	large	100	2.00×10^{-3}
4	small	50	4.00×10^{-3}

Look at the student's results for experiment 2.

Calculate the **mean rate of reaction** in experiment 2.

Give your answer to **3** significant figures and in **standard form**.

Mean rate of reaction = g/s [3]

Total Marks for Question Set 7: 14

Resource Materials

The Periodic Table of the Elements

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(0)
1 1 H hydrogen 1.0	2 4 Be beryllium 9.0	13 5 B boron 10.8	14 6 C carbon 12.0	15 7 N nitrogen 14.0	16 8 O oxygen 16.0	17 9 F fluorine 19.0	18 10 Ne neon 20.2
3 3 Li lithium 6.9	4 4 Be beryllium 9.0	13 5 B boron 10.8	14 6 C carbon 12.0	15 7 N nitrogen 14.0	16 8 O oxygen 16.0	17 9 F fluorine 19.0	18 10 Ne neon 20.2
11 11 Na sodium 23.0	12 12 Mg magnesium 24.3	13 5 Al aluminium 27.0	14 6 Si silicon 28.1	15 7 P phosphorus 31.0	16 8 S sulfur 32.1	17 9 Cl chlorine 35.5	18 18 Ar argon 39.9
19 19 K potassium 39.1	20 20 Ca calcium 40.1	31 31 Ga gallium 69.7	32 32 Ge germanium 72.6	33 33 As arsenic 74.9	34 34 Se selenium 79.0	35 35 Br bromine 79.9	36 36 Kr krypton 83.8
37 37 Rb rubidium 85.5	38 38 Sr strontium 87.6	49 49 In indium 114.8	50 50 Sn tin 118.7	51 51 Sb antimony 121.8	52 52 Te tellurium 127.6	53 53 I iodine 126.9	54 54 Xe xenon 131.3
55 55 Cs caesium 132.9	56 56 Ba barium 137.3	81 81 Tl thallium 204.4	82 82 Pb lead 207.2	83 83 Bi bismuth 209.0	84 84 Po polonium 209.0	85 85 At astatine	86 86 Rn radon
87 87 Fr francium	88 88 Ra radium		114 114 Fl flerovium		116 116 Lv livermorium		
		112 112 Cn copernicium		111 111 Rg roentgenium			
		110 110 Ds darmstadtium		109 109 Mt meitnerium			
		108 108 Hs hassium		107 107 Bh bohrium			
		106 106 Sg seaborgium		105 105 Db dubnium			
		104 104 Rf rutherfordium		103 103 Lr lawrencium			
		102 102 Ni nickel		101 101 Pt platinum			
		100 100 Pd palladium		99 99 Au gold			
		98 98 Rh rhodium		97 97 Ag silver			
		96 96 Ru ruthenium		95 95 Cd cadmium			
		94 94 Tc technetium		93 93 Zn zinc			
		92 92 Mo molybdenum		91 91 Cu copper			
		90 90 Zr zirconium		89 89 Ni nickel			
		88 88 Y yttrium		87 87 Co cobalt			
		86 86 Sc scandium		85 85 Fe iron			
		84 84 Ti titanium		83 83 Mn manganese			
		82 82 V vanadium		81 81 Cr chromium			

Key
atomic number
Symbol
name
relative atomic mass

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge