

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Chemistry/Additional Science

Unit C2: Discovering Chemistry

Foundation Tier

Tuesday 9 June 2015 – Afternoon

Time: 1 hour

Paper Reference

5CH2F/01

You must have:

Calculator, ruler

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

P44683A

©2015 Pearson Education Ltd.

1/1/1/1/1/1/



PEARSON

The Periodic Table of the Elements

1	2	Key										3	4	5	6	7	0	
		relative atomic mass atomic symbol atomic (proton) number																
7	9											11	12	14	16	19	20	
Li lithium 3	Be beryllium 4											B boron 5	C carbon 6	N nitrogen 7	O oxygen 8	F fluorine 9	Ne neon 10	
23	24											27	28	31	32	35.5	40	
Na sodium 11	Mg magnesium 12											Al aluminium 13	Si silicon 14	P phosphorus 15	S sulfur 16	Cl chlorine 17	Ar argon 18	
39	40											70	73	75	79	80	84	
K potassium 19	Ca calcium 20											Ga gallium 31	Ge germanium 32	As arsenic 33	Se selenium 34	Br bromine 35	Kr krypton 36	
85	88											115	119	122	128	127	131	
Rb rubidium 37	Sr strontium 38											In indium 49	Sn tin 50	Sb antimony 51	Te tellurium 52	I iodine 53	Xe xenon 54	
133	137											204	207	209	[209]	[210]	[222]	
Cs caesium 55	Ba barium 56											Tl thallium 81	Pb lead 82	Bi bismuth 83	Po polonium 84	At astatine 85	Rn radon 86	
[223]	[226]											Elements with atomic numbers 112-116 have been reported but not fully authenticated						
Fr francium 87	Ra radium 88											[272]	[277]	[268]	[271]	[266]	[261]	[227]
												Rg roentgenium 111	Hs hassium 108	Mt meitnerium 109	Ds darmstadtium 110	Sg seaborgium 106	Rf rutherfordium 104	Ac* actinium 89

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.



BLANK PAGE

Questions begin on next page.



P 4 4 6 8 3 A 0 3 2 0

Answer ALL questions

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Halogens

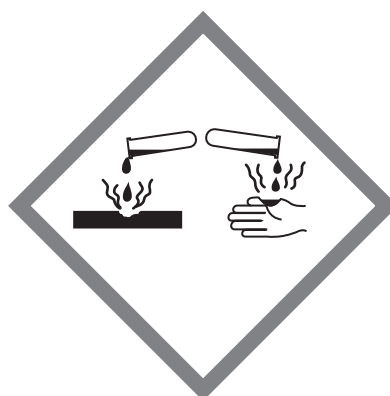
- 1 The table gives information about the colours and physical states at room temperature of the halogens, chlorine, bromine and iodine.

(a) Complete the table.

(3)

name	colour at room temperature	physical state at room temperature
chlorine		gas
bromine		liquid
iodine	grey	

(b) These two hazard symbols are attached to a container of liquid bromine.



A chemist uses bromine in an experiment.

Use the hazard symbols to suggest safety precautions the chemist should take when using the bromine.

(2)

.....

.....

.....



(c) Magnesium reacts with bromine to form magnesium bromide.

Write the word equation for this reaction.

(2)

(d) Sodium reacts with chlorine to form sodium chloride.

Which of these is the formula for sodium chloride?

Put a cross (X) in the box next to your answer.

(1)

☐ **A** SCl

☐ **B** NaOCl

☐ **C** NaCl

☐ **D** SOCl

(Total for Question 1 = 8 marks)

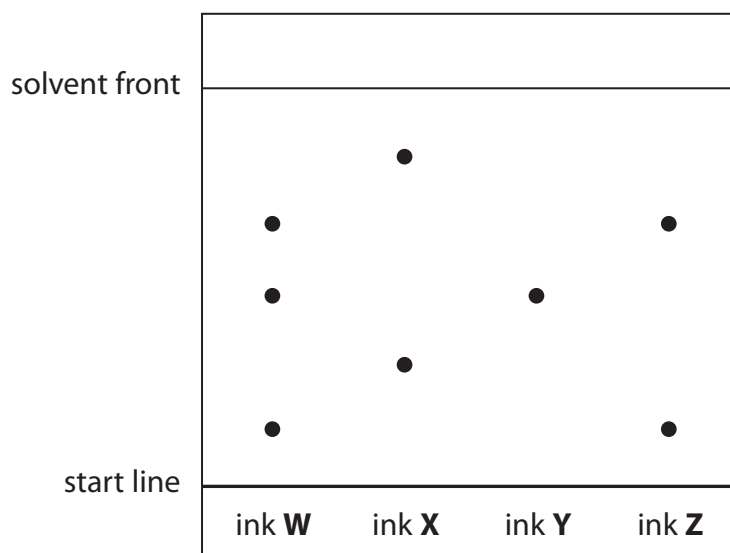


Mixtures and compounds

- 2 (a) Paper chromatography can be used to separate the coloured dyes in inks.

A student carried out a chromatography experiment on four inks, **W**, **X**, **Y** and **Z**.

The diagram shows the result.



- (i) State the letter of the ink that contained only one coloured dye.

(1)

- (ii) Ink **W** has been made by mixing two of the other inks together.

State the two inks that could have been mixed to make ink **W**.

(1)

and

- (b) Complete the sentence by putting a cross (☒) in the box next to your answer.

Oil and water are immiscible liquids.

A mixture of oil and water is best separated by using

(1)

- ☐ **A** distillation
- ☐ **B** evaporation
- ☐ **C** a filter funnel
- ☐ **D** a separating funnel



- (c) Which row of the table correctly shows the boiling point and ability to conduct electricity of a simple molecular, covalent liquid?

Put a cross (X) in the box next to your answer.

(1)

	boiling point	ability to conduct electricity
☒ A	low	good
☒ B	high	poor
☒ C	low	poor
☒ D	high	good

- (d) Hydrogen chloride, HCl, can be formed by the reaction of hydrogen, H_2 , with chlorine, Cl_2 .

Write the balanced equation for this reaction.

(2)

- (e) The electronic configuration of hydrogen is 1.
The electronic configuration of chlorine is 2.8.7.

Draw a dot and cross diagram to show the arrangement of electrons in a molecule of hydrogen chloride, HCl.

Show outer electrons only.

(2)

(Total for Question 2 = 8 marks)



Ions and analysis

3 (a) Which of the following is the formula of a cation?

Put a cross (X) in the box next to your answer.

(1)

- ☐ **A** Mg
- ☐ **B** Na⁺
- ☐ **C** H₂O
- ☐ **D** F⁻

(b) (i) The formula of a potassium ion is K⁺ and of a carbonate ion is CO₃²⁻.

Which of the following is the formula of potassium carbonate?

Put a cross (X) in the box next to your answer.

(1)

- ☐ **A** KCO₃
- ☐ **B** K(CO)₃
- ☐ **C** K₂CO₃
- ☐ **D** K(CO₃)₂

(ii) When dilute hydrochloric acid is added to potassium carbonate, a gas is evolved.

Describe the test for this gas.

(2)

.....

.....

.....

.....



- (c) Barium nitrate solution is added to potassium sulfate solution in a beaker.
A white precipitate of barium sulfate forms in a mixture with potassium nitrate solution.

Describe how you would obtain a pure, dry sample of barium sulfate from the mixture in the beaker.

(3)

.....

.....

.....

.....

.....

.....

- (d) Magnesium oxide is an ionic compound.

The electronic configuration of magnesium is 2.8.2.

The electronic configuration of oxygen is 2.6.

Describe, in terms of electrons, how a magnesium atom and an oxygen atom form ions in magnesium oxide, MgO.

(3)

.....

.....

.....

.....

.....

.....

- (e) Calculate the relative formula mass of magnesium oxide, MgO.
(relative atomic masses: O = 16; Mg = 24)

(1)

.....

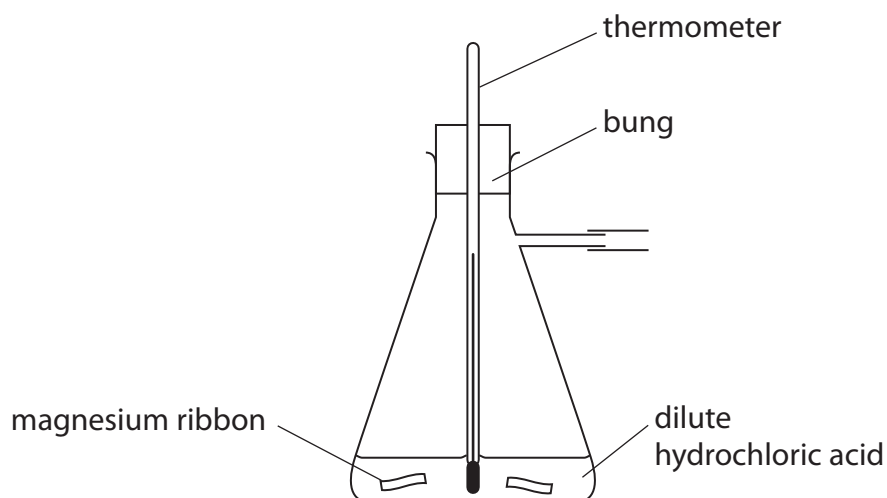
relative formula mass =

(Total for Question 3 = 11 marks)

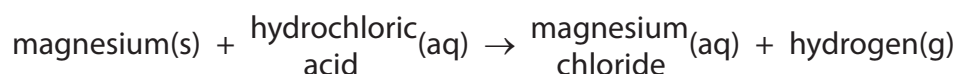


Chemical reactions

- 4 The apparatus shown was used by a student to investigate the reaction between strips of magnesium ribbon and **excess** dilute hydrochloric acid.



The word equation for the reaction is



- (a) States of substances in reactions can be shown by state symbols.

Explain the difference between magnesium chloride(aq) and magnesium chloride(l).

(2)

- (b) Describe what you would **see** when magnesium ribbon reacts with dilute hydrochloric acid.

(1)

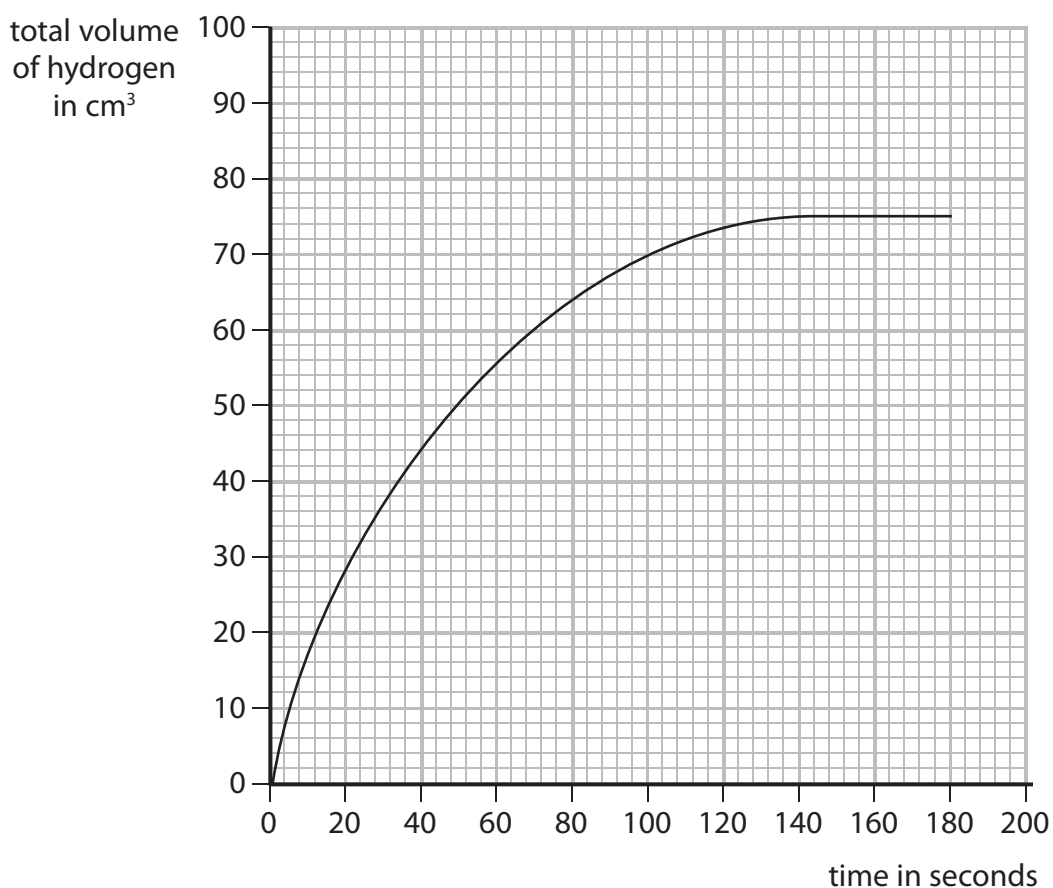


(c) Every 20 seconds, the student recorded the total volume of hydrogen produced in the reaction.

- (i) Name a piece of apparatus the student should use to measure the volume of hydrogen produced.

(1)

The results are shown on the graph.



- (ii) After how many seconds had all the magnesium reacted?

(1)

..... seconds

- (iii) The experiment is repeated using the same volume of a more concentrated hydrochloric acid solution. All other conditions were kept the same.

On the graph draw a curve to show how the volume of hydrogen changes with time during this experiment.

(2)



- (d) A student repeated the original experiment using the same mass of magnesium as a powder instead of as ribbon.

All other conditions were the same as in the first experiment.

Explain the effect on the rate of reaction of using magnesium powder instead of magnesium ribbon.

(2)

.....

.....

.....

.....

- (e) When magnesium reacts with dilute hydrochloric acid there is a change in temperature.

In an experiment the results were

temperature at start = 21°C

temperature at end = 62°C

Explain what conclusion can be made about the type of reaction, from these results.

(2)

.....

.....

.....

.....

.....

(Total for Question 4 = 11 marks)



Atoms and the periodic table

- 5 (a) Complete the table to show the relative mass of a neutron and of an electron.

(2)

particle	relative mass
proton	1
neutron	
electron	

- (b) Complete the sentence by putting a cross (X) in the box next to your answer.

An atom has no overall charge because it contains

(1)

- ☐ **A** more protons than electrons
- ☐ **B** the same number of electrons and protons
- ☐ **C** the same number of electrons and neutrons
- ☐ **D** more neutrons than electrons

- (c) The atomic number of lithium is 3.
The mass number of an atom of lithium is 7.

State the name and number of each of the particles in the nucleus of this atom.

(2)

.....

.....

.....

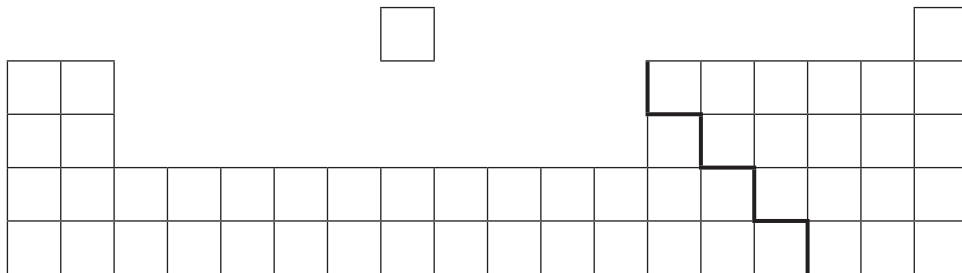


*(d) Here is some information about the periodic table.

In the periodic table elements are arranged in rows and columns. The position of an element in the periodic table depends on its atomic structure. Elements with similar chemical properties are found in the same parts of the periodic table.

Identify different parts of the periodic table and explain how the position of an element in the periodic table is linked to its chemical properties and atomic structure.

(You are provided with an outline of the periodic table below and you may use this to help your answer.)



(6)

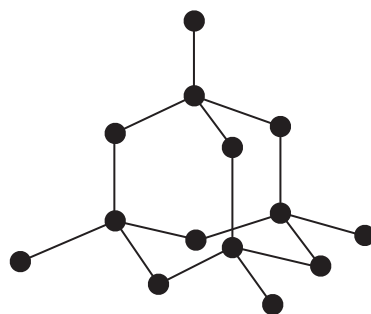
[illegible]

(Total for Question 5 = 11 marks)



Elements

- 6 (a) The arrangement of carbon atoms in diamond is shown.



diamond

Explain why diamond has a very high melting point.

(2)

.....

.....

.....

.....



(b) (i) Calculate the percentage by mass of calcium in calcium chloride, CaCl_2 .

(relative atomic masses $\text{Cl} = 35.5$; $\text{Ca} = 40$;
relative formula mass $\text{CaCl}_2 = 111$)

(2)

.....

.....

.....

.....

percentage by mass = %

(ii) Which row of the table correctly shows the solubility of calcium chloride and barium sulfate in water?

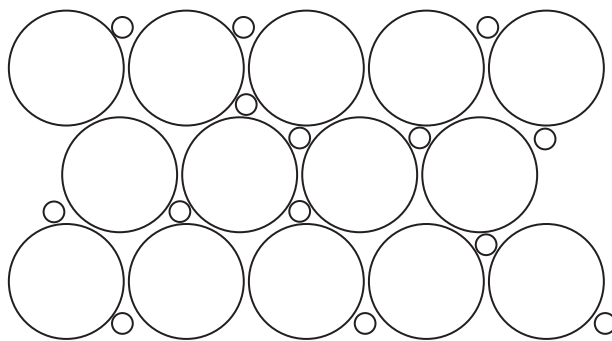
Put a cross (X) in the box next to your answer.

(1)

	calcium chloride	barium sulfate
☐ A	soluble	soluble
☐ B	insoluble	insoluble
☐ C	insoluble	soluble
☐ D	soluble	insoluble



*(c) The diagram shows the structure of a metal.



Use the diagram to describe the structure of a metal and to explain why metals are malleable and conduct electricity.

(6)

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

(Total for Question 6 = 11 marks)

TOTAL FOR PAPER = 60 MARKS



BLANK PAGE

