Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International GCSE (9–1)

Time 1 hour 10 minutes

Paper reference **4SS0/1C**

Science (Single Award)

Chemistry
PAPER: 1C

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.*
- Calculators may be used.

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.*

Advice

- Read each question carefully before you start to answer it.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 7 0 9 4 3 A 0 1 2 0

Pearson

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112–116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** 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.

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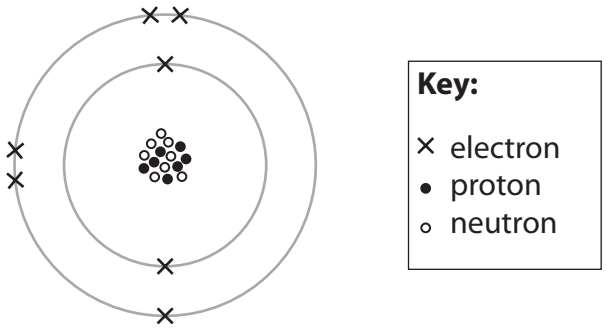
Answer ALL questions.

1 (a) Complete the table to show the relative mass and relative charge of a proton and an electron.

(2)

	Neutron	Proton	Electron
Relative mass	1		
Relative charge	0		

(b) The diagram represents an atom of an element.



(i) Use numbers from the box to complete the table.

You may use each number once, more than once or not at all.

2	5	7	8	15

(3)

Atomic number of atom	
Mass number of atom	
Group number of element in Periodic Table	

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(ii) Give the name of this element.

(1)

.....

(iii) Give the charge on the ion formed from this element.

(1)

.....

(Total for Question 1 = 7 marks)

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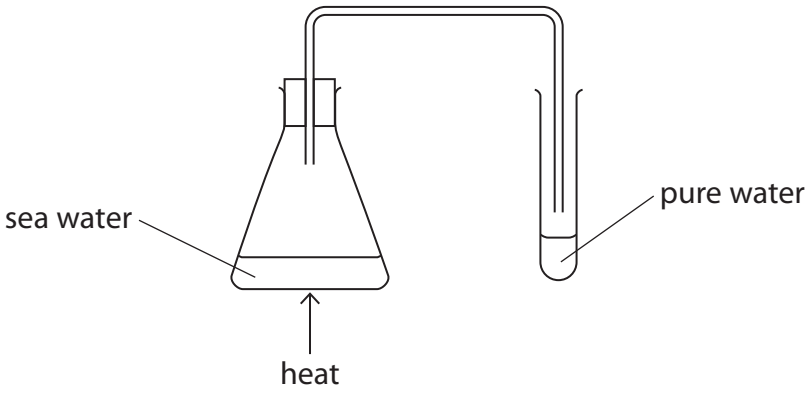
2 This question is about separating mixtures.

(a) The diagram shows apparatus that can be used to obtain pure water from sea water.



(i) Give the name of this technique.

(1)

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(ii) Explain a change to the apparatus that would improve the collection of pure water from the heated sea water.

(2)

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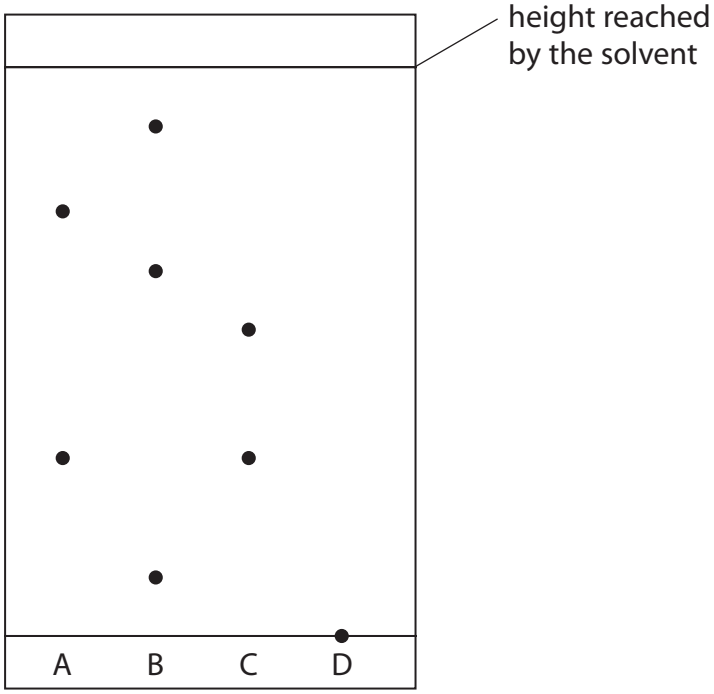
(b) The dyes in samples of four inks, A, B, C and D, were analysed using paper chromatography. The solvent used was water.

The diagram shows the results obtained.



(i) Determine the R_f value of the dye that is in ink A and in ink C.

(3)

R_f = ...

(ii) Ink D is a mixture of three dyes.

Give a change to the experiment that would be needed to separate the dyes in ink D.

(1)

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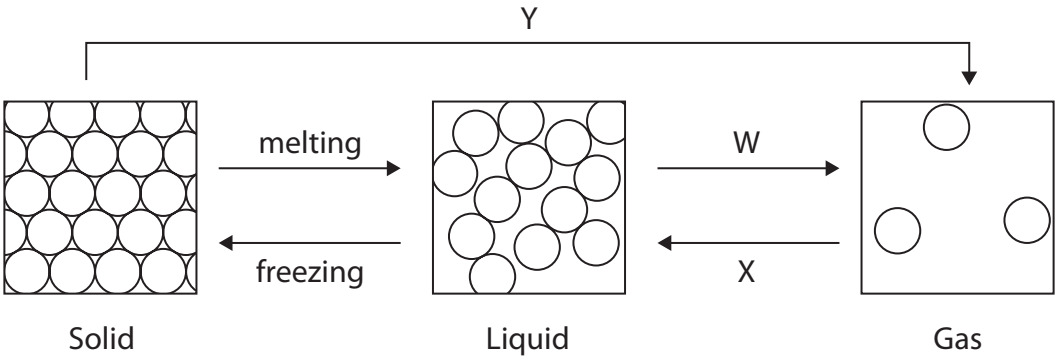
(Total for Question 2 = 7 marks)

3 This question is about particles.

(a) The diagram shows how particles are arranged in a solid, a liquid and a gas.



(i) Name the change of state W.

(1)

.....

(ii) Name the change of state X.

(1)

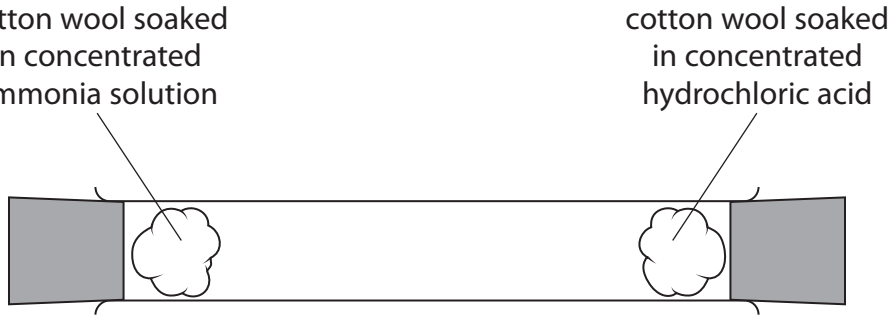
.....

(iii) Name the change of state Y.

(1)

.....

(b) A teacher uses this apparatus to demonstrate the movement of ammonia gas and hydrogen chloride gas particles.



After several minutes a ring of solid ammonium chloride forms.

Ammonia gas particles travel more quickly than hydrogen chloride gas particles.

(i) Draw on the diagram the position of the ring of solid ammonium chloride.

(1)

(ii) State the name given to the movement of gas particles in this experiment.

(1)

.....

(iii) Complete the equation for the reaction by adding the state symbols.

(1)

NH_3(.....) + HCl(.....) → NH_4Cl(.....)

(iv) Gas particles travel at high speeds.

Give two reasons why it takes several minutes for the ring of solid ammonium chloride to form.

(2)

1 .....

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2 .....

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(Total for Question 3 = 8 marks)

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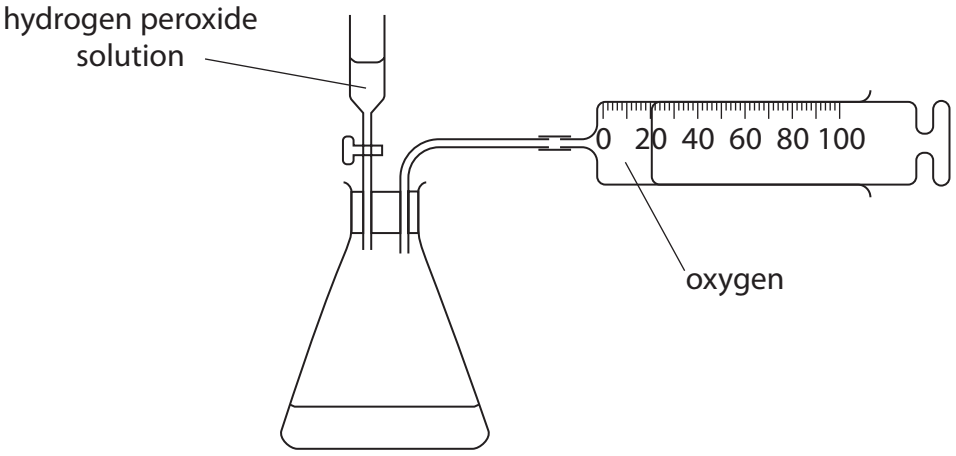
4 A student uses this apparatus to investigate the rate of oxygen production by the decomposition of hydrogen peroxide solution, H_2O_2



(a) Give a test to show that the gas collected is oxygen.

(1)

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(b) This experiment is repeated with 1 g of a solid catalyst in the conical flask.

The rate of reaction is greater in this experiment.

Describe how the student can show that the solid is a catalyst and not a reactant.

(3)

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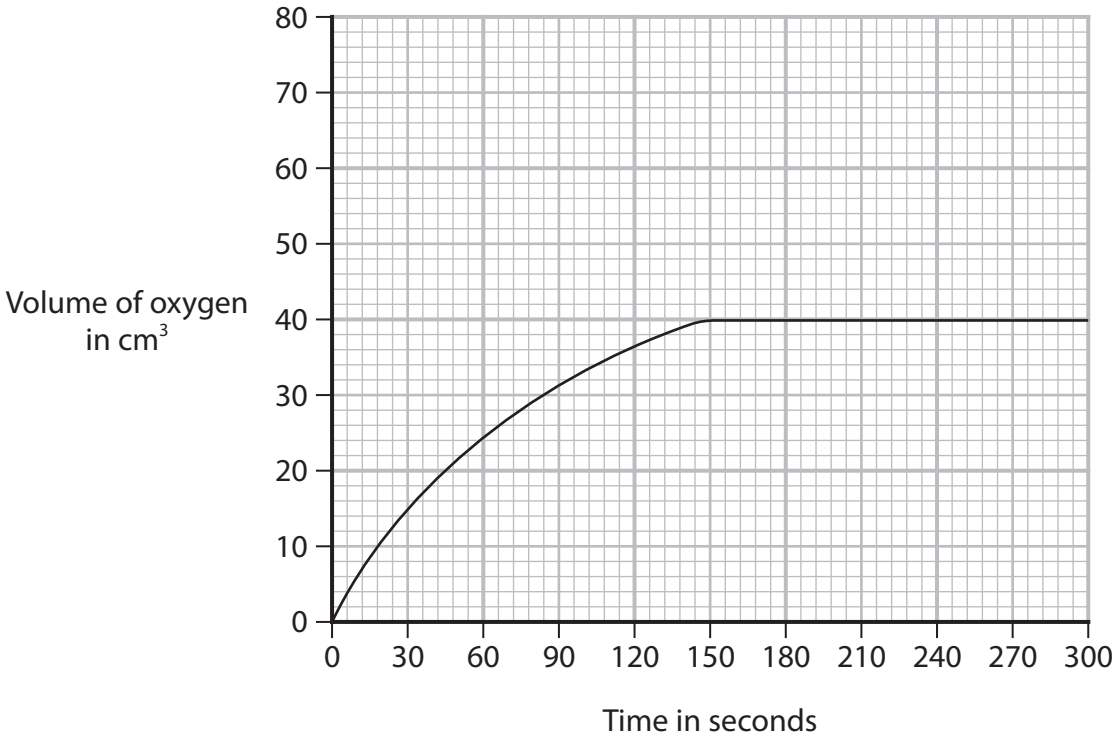
(c) The graph shows the volume of oxygen collected at 20 °C.



The experiment is done at 40 °C using the same volume and the same concentration of hydrogen peroxide solution.

On the grid, sketch the curve you would expect to obtain.

(2)

(Total for Question 4 = 6 marks)

5 This question is about sodium carbonate, Na_2CO_3

(a) A teacher finds an unlabelled bottle containing a white solid.

Describe tests the teacher could do to show that the white solid is sodium carbonate.

(5)

(b) Sodium carbonate is an ionic compound.

Explain why sodium carbonate has a high melting point.

Refer to structure and bonding in your answer.

(3)

(Total for Question 5 = 8 marks)

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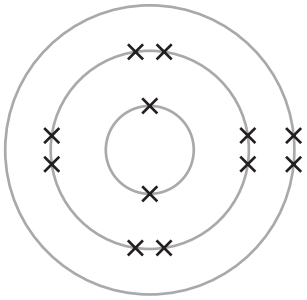
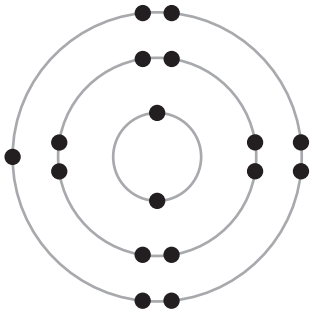
6 (a) The diagram shows the electronic configuration of an atom of magnesium and an atom of chlorine.



Magnesium



Chlorine

Describe the changes in the electronic configurations of magnesium and chlorine when they react to form magnesium chloride, $MgCl_2$

(2)

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(b) A sample of chlorine contains these percentages of two isotopes.

Cl-35 = 70% Cl-37 = 30%

(i) Use this information to calculate the relative atomic mass (A_r) of this sample of chlorine.

(2)

A_r = ...

(ii) Both chlorine isotopes react with magnesium in the same way.

Give a reason why both isotopes react in the same way.

(1)

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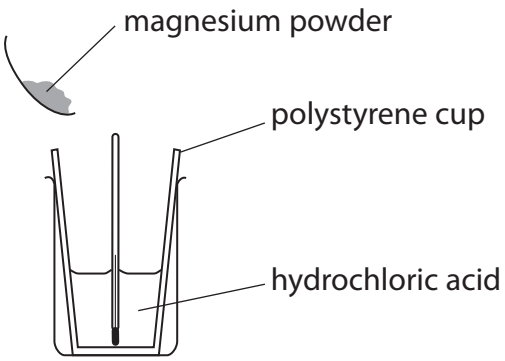
(c) A student uses this apparatus to investigate the temperature change when magnesium powder reacts with hydrochloric acid.



The student uses this method.

- pour 100 cm^3 of hydrochloric acid into a polystyrene cup
- measure the initial temperature of the acid
- add the magnesium powder and stir
- measure the highest temperature reached by the mixture

The table shows the student's results.

Initial temperature of the acid in °C	18.1
Highest temperature of the mixture in °C	45.6

(i) Use the student's results to explain the type of reaction that occurs when magnesium is added to hydrochloric acid.

(2)

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(ii) Give a reason why the student uses a polystyrene cup.

(1)

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(iii) Use the student's results to calculate the heat energy change (Q), in joules, for this reaction.

[for 1.00 cm^3 of the mixture, mass = 1.00 g]

[for the mixture, c = 4.2 J / g / °C]

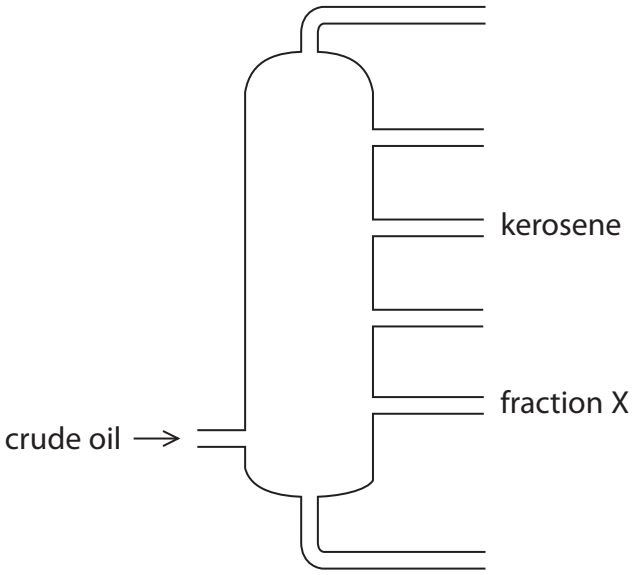
(3)

Q = ... J

(Total for Question 6 = 11 marks)

7 This question is about fractions obtained from crude oil.

(a) The diagram shows a fractional distillation column and two of the fractions obtained from crude oil.



Describe how the colour, boiling point and viscosity of fraction X differs from the kerosene fraction.

(3)

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.....

(b) Octane (C_8H_{18}) is part of the gasoline fraction.

In a limited supply of air, octane undergoes incomplete combustion.

(i) Complete the chemical equation for the incomplete combustion of octane.

(2)

C_8H_{18} + ...O_2 → 5CO + ...CO_2 + ...H_2O

(ii) Give a reason why carbon monoxide (CO) gas is poisonous.

(1)

(iii) Explain how the combustion of a common impurity in gasoline may cause an environmental problem.

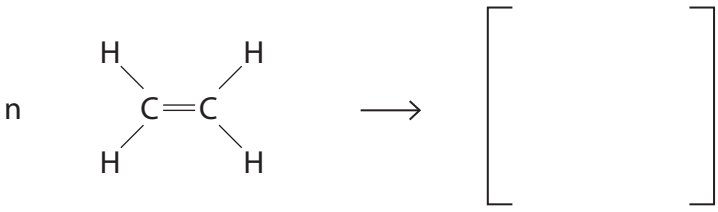
(3)

(c) Ethene is obtained from one of the fractions in crude oil.

Ethene is used to make the polymer poly(ethene).

(i) Complete the equation for the conversion of ethene to poly(ethene).

(2)



(ii) Explain why poly(ethene) is difficult to dispose of in landfill sites.

(2)

(Total for Question 7 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

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