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Name:	Class: Sec _____	Index No.: _____
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**MERIDIAN SECONDARY SCHOOL  
END-OF-YEAR EXAMINATION 2017**

**SCIENCE (CHEMISTRY)  
5076/1, 5078/1**

**Paper 1**

12 October 2017

**SECONDARY 3 EXPRESS**

**1 hour**

**Additional Material:  
OTAS**

**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the OTAS in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate OTAS.

**Read the instructions on the OTAS very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page .....9.....

The use of an approved scientific calculator is expected, where appropriate.

The total number of marks for this paper is **40**.

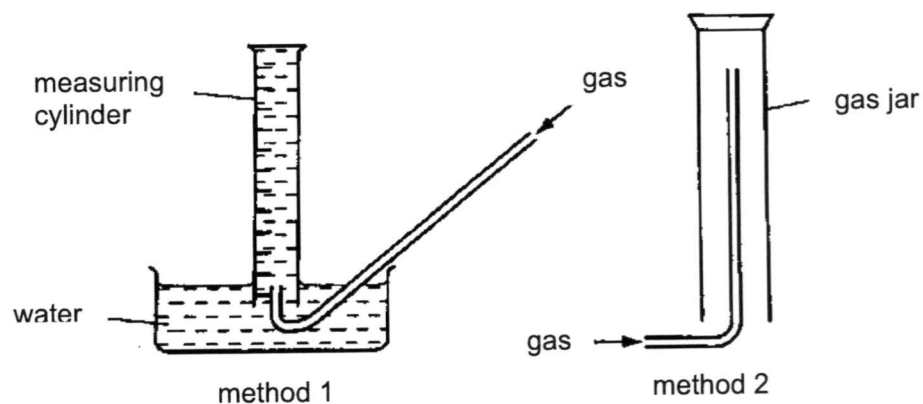
For Examiner's Use	
Total Marks	

This question paper consists of **12** printed pages, including this page.

Setter: Mr Lek Gim Chye

[Turn over

21 The diagrams below show two methods of collecting gases.



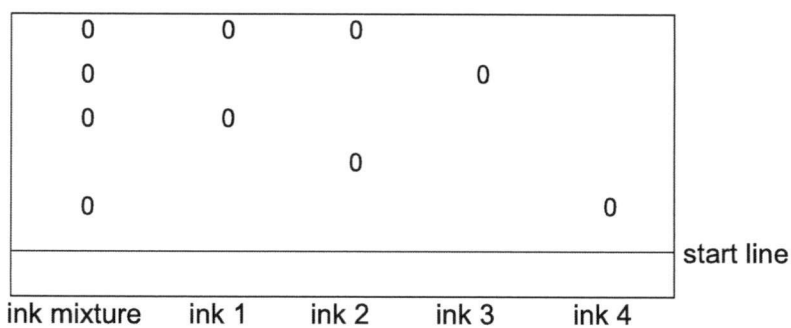
Which gas **cannot** be collected by both methods?

	solubility in water	density
<b>A</b>	insoluble in water	denser than air
<b>B</b>	insoluble in water	less dense than air
<b>C</b>	soluble in water	denser than air
<b>D</b>	soluble in water	less dense than air

22 Besides a 10 cm<sup>3</sup> pipette, which of the following can be used to measure a 10 cm<sup>3</sup> portion of a solution for accurate titration?

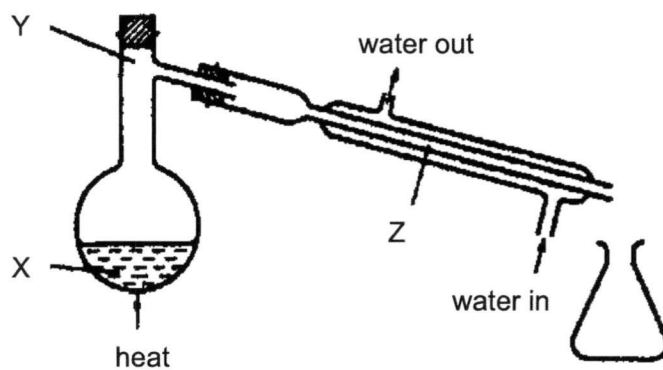
- A 50.0 cm<sup>3</sup> burette
- B 25.0 cm<sup>3</sup> pipette
- C 50 cm<sup>3</sup> measuring cylinder
- D 100 cm<sup>3</sup> beaker

- 23 In a paper chromatography experiment to identify the inks present in a mixture, the results shown below were obtained.



The inks present in the mixture were

- A 2 and 3.  
 B 3 and 4.  
 C 1, 2 and 3.  
 D 1, 3 and 4.
- 24 The diagram shows the apparatus being used to distil seawater.



At which points is the temperature 100 °C?

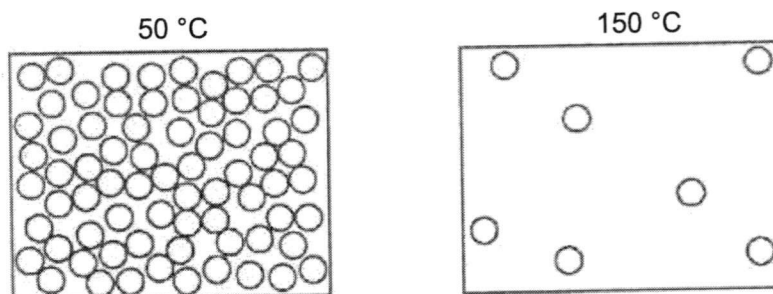
- A X only  
 B Y only  
 C X and Z  
 D Y and Z

Turn Over

25 Which of the following processes involves the particles moving faster?

- A freezing
- B condensation
- C evaporation
- D crystallisation

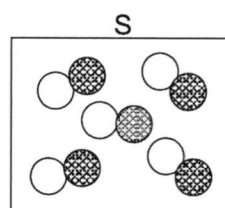
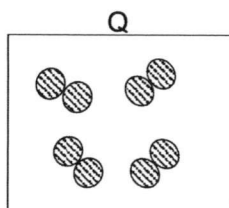
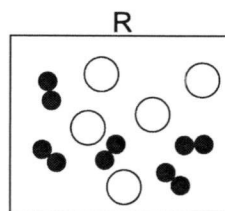
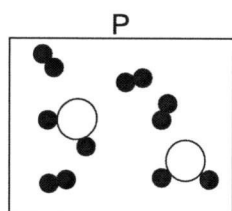
26 The diagram shows the arrangement of the particles in a substance at two different temperatures.



Which of the following could be the melting point and boiling point of the substance?

	melting point / °C	boiling point / °C
<b>A</b>	49	148
<b>B</b>	65	148
<b>C</b>	49	161
<b>D</b>	65	161

The diagrams below represent the particles in four substances, P, Q, R and S. Use the diagrams to answer questions 27 and 28.



27 Which of the substances is a compound?

- A P
- B Q
- C R
- D S

28 Which of the substances would have fixed melting and boiling points?

- A P and Q
- B Q and S
- C P and R
- D R and S

29 How many protons and neutrons are there in one atom of the carbon isotope which has mass number 14?

	protons	neutrons
A	6	6
B	6	8
C	8	12
D	8	14

Turn Over

- 30 The atomic number of calcium is 20.

The electronic structure of the calcium ion can be represented as

- A 2,8,8.
- B 2,8,2.
- C 2,8,8,2.
- D 2,8,8,4.

- 31 The electronic structures of atoms P, Q and R are given below.

P      2,1                  Q      2,6                  R      2,7

What are the formulae of the compounds formed between P and Q and between P and R?

	P and Q	P and R
A	PQ	P <sub>2</sub> R
B	PQ	PR <sub>2</sub>
C	P <sub>2</sub> Q	PR
D	PQ <sub>2</sub>	PR

- 32 In which pair do the elements combine to form a compound consisting of simple molecules?
- A copper and oxygen
  - B helium and oxygen
  - C potassium and chlorine
  - D carbon and hydrogen
- 33 Which of the following gases is the **least** common in air?
- A carbon dioxide
  - B argon
  - C oxygen
  - D nitrogen

34 Which gas is the main cause of damage to the stonework on buildings?

- A carbon dioxide
- B carbon monoxide
- C sulfur dioxide
- D methane

35 The chart shows the range of colours for four different indicators.

Which indicator is able to distinguish between a weak alkali and a strong alkali?

	pH value													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	yellow						blue							
B	red								blue			yellow		
C	red								blue					
D	colourless				blue									

36 Acids can react with bases, carbonates and metals.

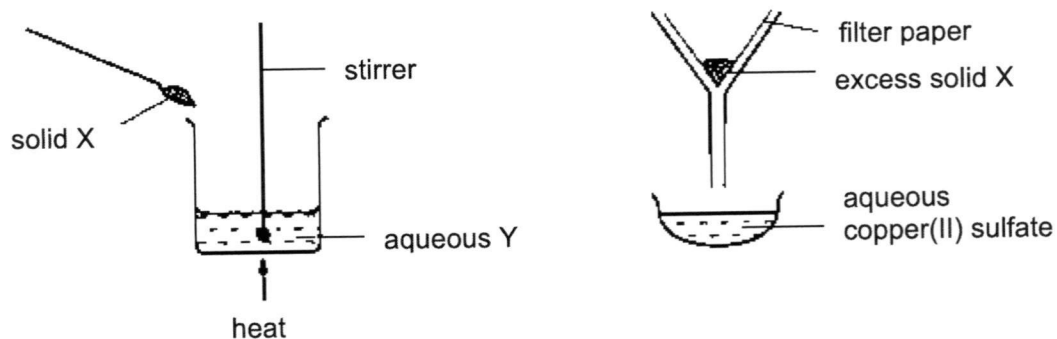
Which of the reactions can produce a gas?

key: ✓ = gas is produced  
 ✗ = no gas is produced

	reaction of acid with a		
	base	carbonate	metal
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✓	✓

Turn Over

- 37 The apparatus shown can be used to prepare aqueous copper(II) sulfate.



What are substances X and Y?

	X	Y
A	copper	sulfuric acid
B	copper(II) chloride	sulfuric acid
C	sodium sulfate	copper(II) chloride
D	copper(II) oxide	sulfuric acid

- 38 X, Y and Z are in the same period of the Periodic Table. X forms an acidic oxide, Y forms a basic oxide and Z forms an amphoteric oxide.

If X, Y and Z were placed in order of increasing proton number, the order would be

- A X, Z, Y.  
 B X, Y, Z.  
 C Y, Z, X.  
 D Y, X, Z.

- 39 The table below shows some properties of four elements.

Which element could be sodium?

	density / g/cm <sup>3</sup>	melting point / °C	electrical conductivity
A	0.97	97.8	good
B	2.34	2300	poor
C	3.12	-7.2	poor
D	8.96	1083	good

- 40 Which statement is most likely to be true about the elements in Group I of the Periodic Table?
- A They are equally reactive.
  - B They form chloride of similar formulae.
  - C The atoms become smaller down the group.
  - D The proton number of the elements decreases down the group.

~ END OF PAPER ~

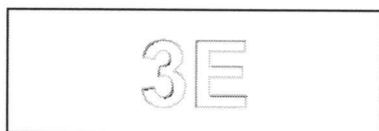
5076, 5077 and 5078 SCIENCE GCE ORDINARY LEVEL SYLLABUS (2018)

### The Periodic Table of Elements

		Group																																																																															
I	II	III	IV	V	VI	VII	0																																																																										
		1 H hydrogen 1										2 He helium 4																																																																					
3 Li lithium 7	4 Be beryllium 9	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>Key</b>                      proton (atomic) number                      atomic symbol                      name                      relative atomic mass                 </div>																																																																															
11 Na sodium 23	12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulphur 32	17 Cl chlorine 35.5	18 Ar argon 40	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57-71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -	89-103 actinoids	104 Rf rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	113 Nh nihonium -	114 Fl flerovium -	115 Lv livermorium -	116 Og oganeson -	117 Ts tennessine -	118 Uu unbinilium -	119 Uue unbinilium -	120 Uuo unbinilium -
lanthanoids		57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175	actinoids		89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -																																																

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.)

Name:	Class: Sec _____	Index No.: _____
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**MERIDIAN SECONDARY SCHOOL  
END-OF-YEAR EXAMINATION 2017**

**SCIENCE (CHEMISTRY)  
5076/3, 5078/3**

**Paper 3**

4 October 2017

**SECONDARY 3 EXPRESS**

**1 hour 15 minutes**

**Additional Material:**

Nil

**READ THESE INSTRUCTIONS FIRST**

Write your name, class and index number on all the work that you hand in.  
You may use an HB pencil for any diagrams, graphs, tables or rough working.  
Write in dark blue or black pen.  
Do not use staples, paper clips, glue or correction fluid.

The use of an approved scientific calculator is expected, where appropriate.  
You may lose marks if you do not show your working or if you do not use appropriate units.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer **both** questions.

Write your answers in the spaces provided on the question paper.

A copy of the Periodic Table is printed on page 13.

At the end of the examination, fasten all your work securely together.  
The number of marks is given in brackets [ ] at the end of each question or part question.  
The total number of marks for this paper is **65**.

For Examiner's Use	
Section A	
Section B	
Total Marks	

This question paper consists of **13** printed pages, including this page.

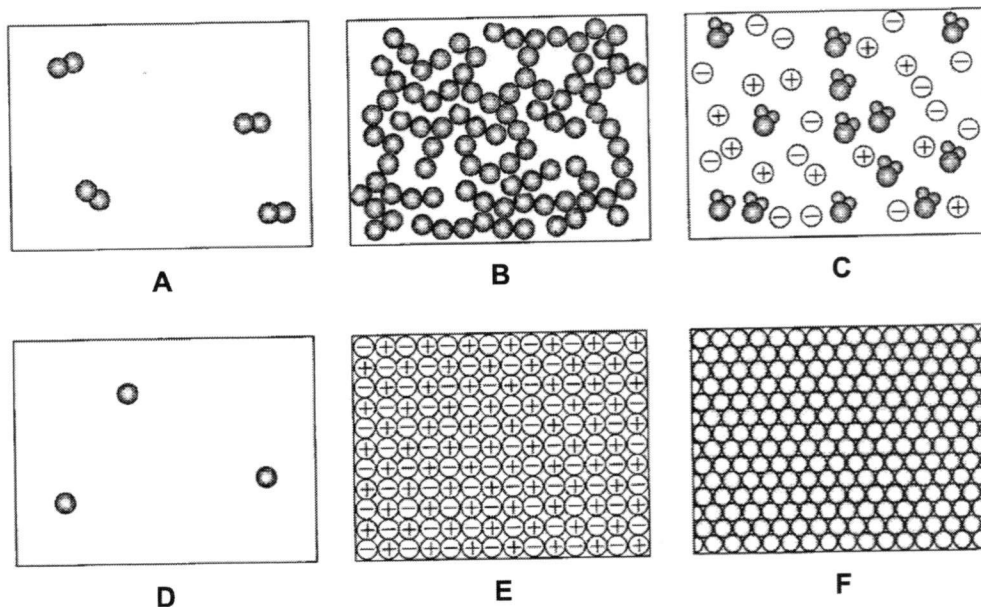
Setter: Mr Lek Gim Chye

[Turn over

## Section A

Answer **all** questions in the spaces provided.

- 1 Fig. 1 shows the particles in six different substances **A** to **F**.



**Fig. 1**

State the substance that can be

- (a) argon gas,

..... [1]

- (b) hydrogen gas,

..... [1]

- (c) solid sodium chloride,

..... [1]

- (d) aqueous sodium chloride,

..... [1]

- (e) solid magnesium metal,

..... [1]

- (f) molten magnesium metal,

..... [1]

- 2 Fig. 2.1 shows the preparation of a coloured solution extracted from purple cabbage.



Fig. 2.1

- (a) After crushing the cabbage leaves, process **M** is carried out to remove any remaining solid bits of the cabbage leaves.

(i) State process **M**.

..... [1]

(ii) Briefly explain how the coloured solution and the solid bits are separated by process **M**.

.....

..... [2]

- (b) The coloured solution is then placed in two different solvents **X** and **Y**.

The chromatograms obtained in both solvents are shown in Fig. 2.2.

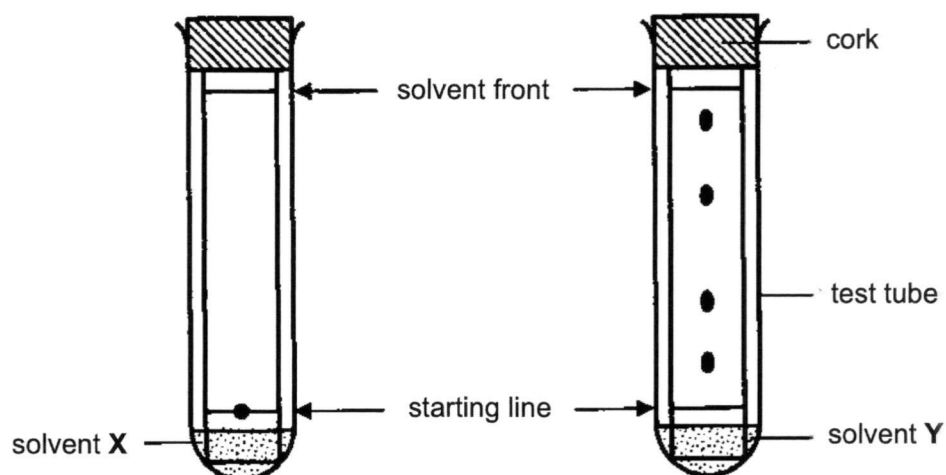


Fig. 2.2

Turn Over

(i) Explain the difference in the chromatograms in both solvents.

.....  
.....  
.....

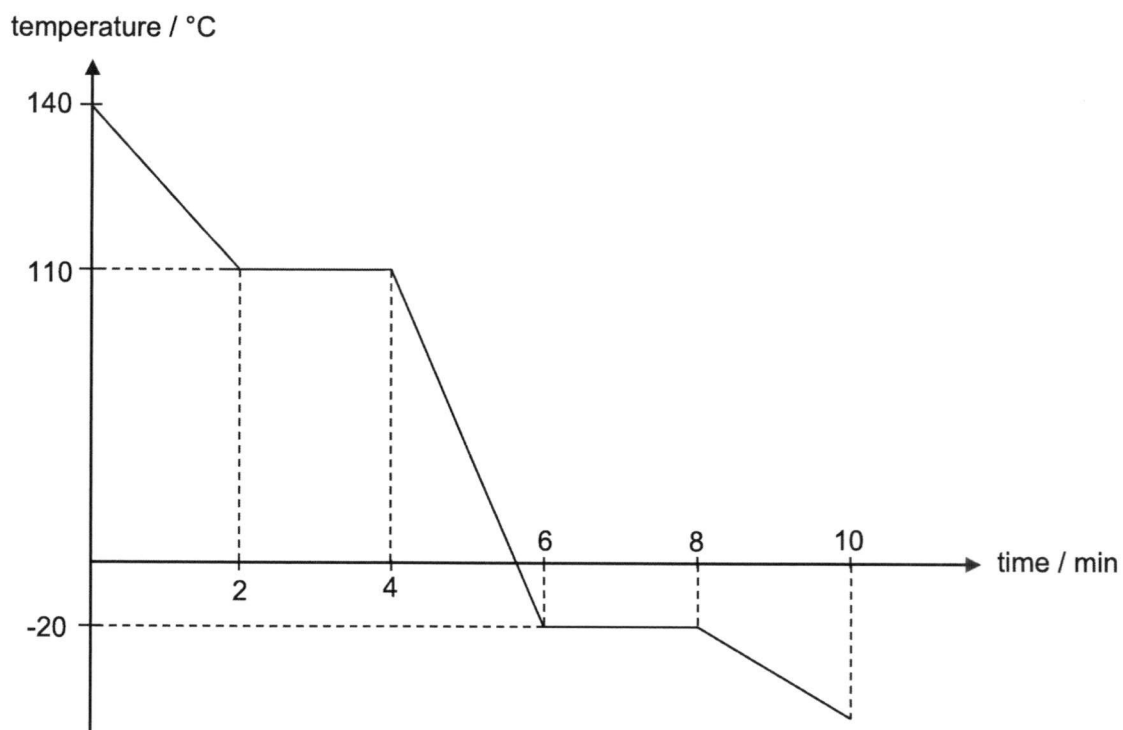
[2]

(ii) Is the coloured solution extracted from the purple cabbage a compound or a mixture? Explain your answer.

.....  
.....

[1]

- 3 At 140 °C, the vapour of substance **X** was allowed to cool. The temperature was measured at regular intervals and the results were plotted on a graph as shown.



Study the graph and answer the following questions.

- (a) How does the graph show that **X** is a pure substance?

.....  
 ..... [1]

- (b) How long did it take for **X** to be completely changed into a liquid?

..... min [1]

- (c) State the physical states of **X**

- (i) from 2 to 4 min and,

..... [1]

- (ii) from 6 to 8 min.

..... [1]

- (d) Describe the arrangement and movement of particles of **X** from 4 to 6 min.

.....  
 ..... [2]

Turn Over

4 Fig. 4.1 shows the structure of an atom of element E.

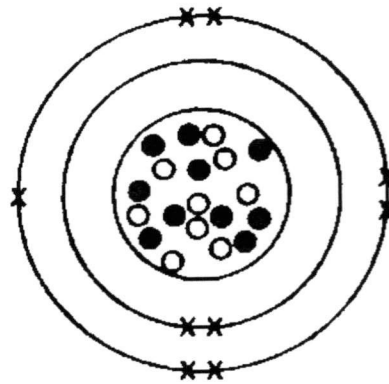


Fig. 4.1

(a) Complete Table 4.1 about the three different particles found in an atom of element E.

Table 4.1

particle	name of particle	relative mass of particle	relative charge of particle
x	.....	.....	.....
○	.....	1	.....
●	.....	1	0

[2]

(b) What is the nucleon number of an atom of E?

.....

[1]

(c) In which group of the Periodic Table is element E? Explain your answer.

.....

.....

[2]

(d) How would the atomic structure of an isotope of E be different?

.....

.....

[1]

- 5 Air is a mixture of gases.

Fig. 5.1 shows the percentages of different gases in air.

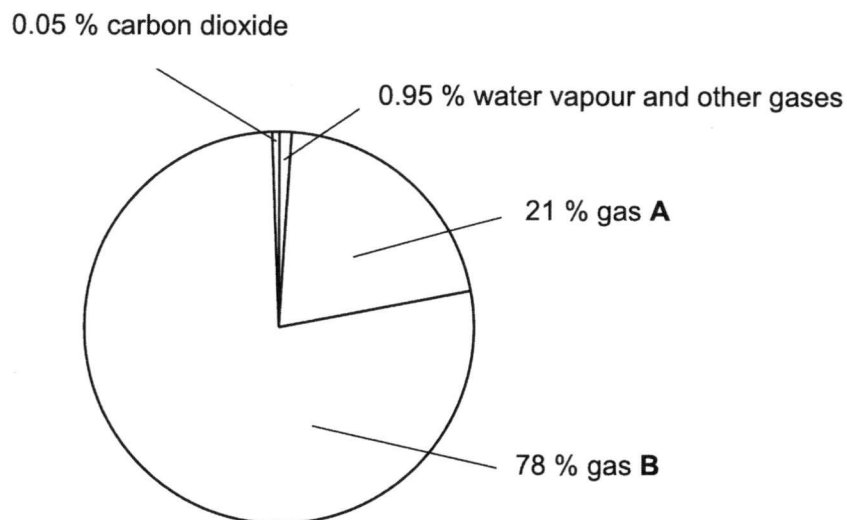


Fig. 5.1

- (a) Suggest what can be done to show the presence of carbon dioxide.

.....  
 ..... [1]

- (b) State the names of

(i) gas A and,

..... [1]

(ii) gas B.

..... [1]

- (c) (i) Name a pollutant gas that can be found in air.

..... [1]

(ii) State the source of this gas.

..... [1]

Turn Over

6 Fig. 6.1 shows a reaction scheme.

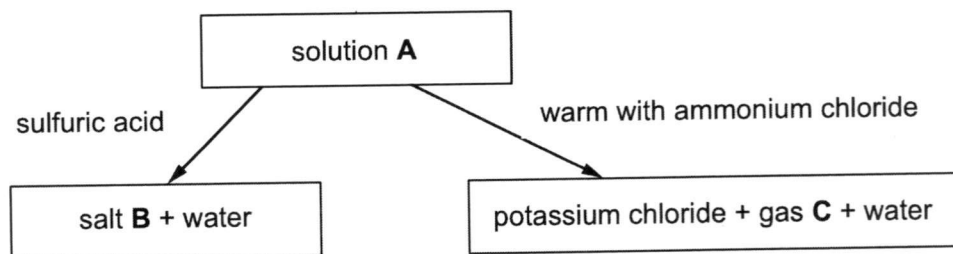


Fig. 6.1

Study the reaction scheme and answer the following questions.

(a) Identify substances **A**, **B** and **C**.

(i) solution **A** .....

[1]

(ii) salt **B** .....

[1]

(iii) gas **C** .....

[1]

(b) Universal indicator is added to solution **A**.

(i) State the final colour of the indicator observed.

.....

[1]

(ii) Identify the ion that caused this colour change.

.....

[1]

(c) Write a chemical equation for the reaction between solution **A** and ammonium chloride.

.....

[1]

- 7 Sodium, magnesium, sulfur and chlorine are in the same period of the Periodic Table.
- (a) (i) State the period that these elements are in.  
..... [1]
- (ii) Explain why these elements are placed in the period stated in (a)(i).  
..... [1]
- (b) Which two of the elements are considered metals? Explain your answer.  
.....  
..... [2]
- (c) Strontium is in the same group of the Periodic Table as magnesium.  
State the symbol of a strontium ion.  
..... [1]
- 8 Lithium, sodium and potassium are members of Group I of the Periodic Table.
- (a) Suggest how these elements are stored in the laboratory.  
..... [1]
- (b) (i) Write a balanced chemical equation to show the reaction between lithium and water.  
..... [2]
- (ii) Describe how the reaction of potassium with water differs from that of lithium with water.  
..... [1]
- (iii) Explain your answer in (b)(ii).  
..... [1]

Turn Over

## Section B

Answer **both** questions in this section.

Write your answers in the spaces provided.

9 A chlorine atom is represented by  ${}^{35}_{17}\text{Cl}$ .

- (a) The numbers 35 and 17 provide information about the atomic structure of this chlorine atom.

Deduce as much information as possible about the atomic structure of this chlorine atom from these numbers.

.....  
 .....

[2]

- (b) Chlorine reacts vigorously with sodium to form sodium chloride.

Fig. 9.1 was proposed to be a diagram to show the electronic structure of sodium chloride.

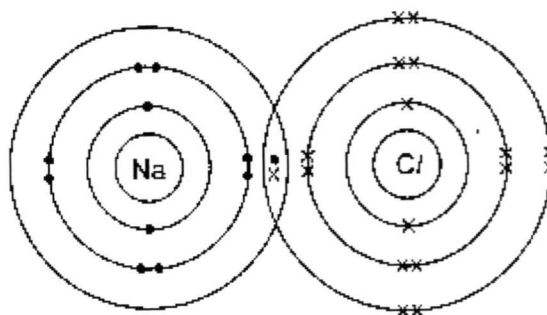


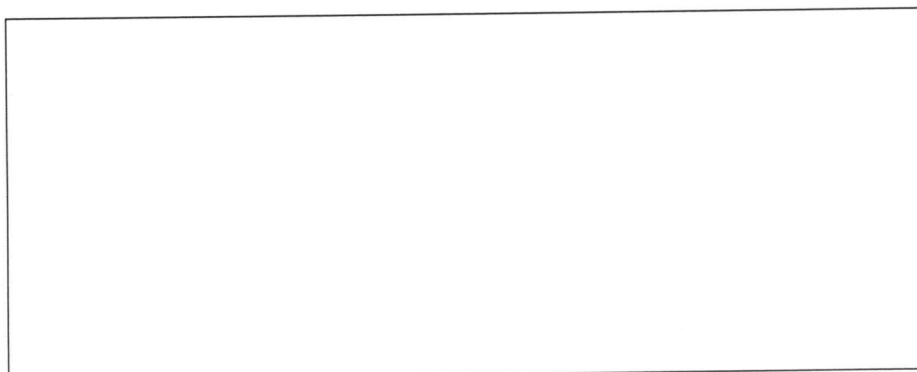
Fig. 9.1

- (i) Explain why this is **not** a possible electronic structure of sodium chloride.

.....  
 .....

[1]

- (ii) Draw a 'dot and cross' diagram to show the arrangement of electrons in sodium chloride.



[2]

- (c) Chlorine can also react with hydrogen to form hydrogen chloride.

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

[2]

- (d) Sodium chloride and hydrogen chloride are two compounds with different properties.

Table 9.1 shows the melting points of sodium chloride and hydrogen chloride.

**Table 9.1**

compound	melting point / °C
sodium chloride	801
hydrogen chloride	-114

Explain why the melting points of these two chlorides are significantly different.

.....

.....

.....

.....

[3]

**Turn Over**

- 10 (a) Write a balanced chemical equation for the reaction between a named metal and a named acid.

metal .....

acid .....

equation ..... [2]

- (b) To prepare a dry sample of sodium nitrate crystals, the following procedure was being carried out.

1. A fixed volume of alkali **X** was placed in a conical flask.
2. A few drops of screened methyl orange indicator was added to the solution.
3. A known concentration of acid **Y** was run in from a burette until the indicator changed colour.
4. The volume of acid **Y** used was recorded.
5. The entire experiment was repeated without using the indicator by adding the same volume of acid **Y** used in step 4.

- (i) Name the method of preparation of salt described above.

..... [1]

- (ii) Suggest the identities of alkali **X** and acid **Y**.

alkali **X** .....

acid **Y** ..... [2]

- (iii) Write an ionic equation for the reaction between **X** and **Y**.

..... [1]

- (iv) Which measuring apparatus is suitable in transferring solution **X** into the conical flask accurately?

..... [1]

- (v) Briefly describe how you should continue after step 5 in order to obtain a dry, crystalline sample of the salt.

.....

.....

..... [3]

~ END OF PAPER ~

## The Periodic Table of Elements

I		Group										III	IV	V	VI	VII	0		
		<b>Key</b>										1 H hydrogen 1							2 He helium 4
		proton (atomic) number atomic symbol name relative atomic mass										5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20		
3 Li lithium 7	4 Be beryllium 9											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40		
11 Na sodium 23	12 Mg magnesium 24	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 58	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium -	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137
55 Cs caesium 133	56 Ba barium 137	57 - 71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium -	85 At astatine -	86 Rn radon -	87 Fr francium -	88 Ra radium -
87 Fr francium -	88 Ra radium -	89 - 103 actinoids	104 Rf Rutherfordium -	105 Db dubnium -	106 Sg seaborgium -	107 Bh bohrium -	108 Hs hassium -	109 Mt meitnerium -	110 Ds darmstadtium -	111 Rg roentgenium -	112 Cn copernicium -	114 Fl flerovium -	116 Lv livermorium -	-	-	-	-	-	-

lanthanoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium -	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium -	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium -	94 Pu plutonium -	95 Am americium -	96 Cm curium -	97 Bk berkelium -	98 Cf californium -	99 Es einsteinium -	100 Fm fermium -	101 Md mendelevium -	102 No nobelium -	103 Lr lawrencium -

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

**Meridian Secondary School**  
**Sec 3E End-of-Year Examination 2017**  
**Paper 1 & Paper 3 Answer Scheme**

**Paper 1**

Qn No.	Ans	Qn No.	Ans
21	C	31	C
22	A	32	D
23	D	33	A
24	B	34	C
25	C	35	B
26	A	36	D
27	D	37	D
28	B	38	C
29	B	39	A
30	A	40	B

**Paper 3**

Qn	Answer	Marks Allocated
<b>Section A</b>		
1	(a)  (b) <b>A</b> Many students thought that argon gas are diatomic and hydrogen to be monatomic.  (c) <b>E</b>  (d) <b>C</b>  (e) <b>F</b>  (f) <b>B</b>	1 mark each
2	(a) (i) Filtration  (ii) The <b>coloured solution</b> will be the <b>filtrate</b> and the <b>solid bits</b> the <b>residue</b> .  OR  The coloured solution will <b>pass through</b> the filter paper and the solid bits <b>remain</b> in the <b>filter paper</b> .	1  1 1 1

	<p>(b)</p> <p>(i) The coloured solution was <b>not separated</b> in solvent <b>X</b> but was <b>separated</b> in solvent <b>Y</b>. The solution was <b>not soluble</b> in solvent <b>X</b>.</p> <p>(ii) The coloured solution is a <b>mixture</b>. The solution was <b>separated</b> into different substances by a <b>physical method</b>.</p>	<p>1</p> <p>1</p> <p>1</p>																				
3	<p>(a) <b>X freezes at fixed temperature. OR Fixed freezing point.</b></p> <p>(b) 4 min</p> <p>(c) (i) gas and liquid</p> <p>(ii) liquid and solid</p> <p>(d) The particles <b>slide past each</b> other randomly. The particles are packed <b>closely</b> and arranged <b>randomly/disorderly</b>.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>																				
4	<p>(a)</p> <table border="1" data-bbox="330 1149 1121 1480"> <thead> <tr> <th>Particle</th> <th>Name of particle</th> <th>Relative mass</th> <th>Relative charge</th> </tr> </thead> <tbody> <tr> <td></td> <td><b>electron</b></td> <td><math>\frac{1}{1836}</math> <math>\frac{1}{1840}</math></td> <td><b>1-</b></td> </tr> <tr> <td>○</td> <td><b>proton</b></td> <td>1</td> <td><b>1+</b></td> </tr> <tr> <td>•</td> <td><b>neutron</b></td> <td>1</td> <td>0</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>(b) 19</p> <p>(c) Group VII. The atom has <b>7 valence electrons / 7 electrons in the outershell</b>.</p> <p>(d) The isotope would have a <b>different number of neutrons</b>.</p>	Particle	Name of particle	Relative mass	Relative charge		<b>electron</b>	$\frac{1}{1836}$ $\frac{1}{1840}$	<b>1-</b>	○	<b>proton</b>	1	<b>1+</b>	•	<b>neutron</b>	1	0					<p>3 correct entries for 1 mark</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
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•	<b>neutron</b>	1	0																			
5	<p>(a) Pass the gas into limewater. The gas forms <b>white precipitate with limewater</b>.</p> <p>(b) gas <b>A</b> : oxygen gas</p>	<p>1</p> <p>1</p>																				

	Gas <b>B</b> : nitrogen gas	1
	(c)(i) sulfur dioxide OR methane OR ozone OR nitrogen oxides Many wrote "carbon dioxide" and it is not a pollutant.	1
	(ii) Volcanic eruptions/burning of fossil fuel in power stations. OR any other logical answer	1
6	(a) (i) potassium hydroxide / KOH (ii) potassium sulfate / K <sub>2</sub> SO <sub>4</sub>  (iiv) ammonia gas / NH <sub>3</sub>  (b) (i) blue / violet / purple  (ii) hydroxide ion / OH <sup>-</sup>  (c) KOH + NH <sub>4</sub> Cl → KCl + NH <sub>3</sub> + H <sub>2</sub> O	1 1  1  1  1  1
7	(a) (i) Period 3  (ii) Their atoms have <b>3 electron shells</b> . (b) <b>Sodium</b> and <b>magnesium</b> are metals.  Their atoms <b>lose electrons</b> to form <b>positive ions</b> .  (c) Sr <sup>2+</sup>	1  1 1  1  1
8	(a) The elements are stored in oil.  (b) (i) 2 Li + 2 H <sub>2</sub> O → 2 LiOH + H <sub>2</sub>  (ii) The reaction between potassium and water is <b>more vigorous / more violent</b> than that between lithium and water.  (iii) Potassium is <b>more reactive</b> than lithium.	1  1 for correct formulae 1 for balancing  1
<b>Section B</b>		
9	(a) 17 protons and 17 electrons and 18 neutrons  (b) (i) Sodium <b>did not</b> achieve a <b>full valence shell</b> . OR Sodium is a <b>metal</b> and chlorine is <b>non-metal</b> and they bond by <b>transferring electrons</b> .  (ii) Correct number of electrons and charge for Na <sup>+</sup> Correct number of electrons and charge for Cl <sup>-</sup> ACCEPT if only valence electrons are shown.	1 1  1  1  1 1

	<p>(c) Correct number of atoms and sharing of electrons Correct number of electrons</p> <p>(d) Sodium chloride has a <b>high melting point</b> but hydrogen chloride has a <b>low melting point</b>.</p> <p><b>Strong attraction</b> between <b>positive</b> and <b>negative ions</b> in sodium chloride. A <b>lot of energy</b> is needed to overcome this attraction.</p> <p><b>Weak attraction</b> between <b>molecules</b> in hydrogen chloride. <b>Little energy</b> is needed to overcome this attraction.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
10	<p>(a) Metal : Magnesium OR any other logical reactive metal Acid : sulfuric acid OR any other logical acid</p> <p>Equation <math>\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2</math></p> <p>(b) (i) Titration</p> <p>(ii) Alkali <b>X</b> : sodium hydroxide / NaOH [1] Acid <b>Y</b> : nitric acid / HNO<sub>3</sub></p> <p>(iii) <math>\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}</math></p> <p>(iv) pipette / burette</p> <p>(v) <b>Heat</b> the solution with a Bunsen flame until it is <b>saturated</b>. <b>Cool</b> the solution to form <b>crystals</b>. Filter and <b>dry</b> the crystals with <b>filter paper</b>.</p>	<p>1 mark for the correct names and corresponding formula of the metal and the acid.</p> <p>1 mark for the balanced chemical equation.</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

~ End of Answer Scheme ~