Class	Register No.

Candidate Name _____

PEIRCE SECONDARY SCHOOL
MID YEAR EXAMINATION 2019
SECONDARY THREE EXPRESS

SCIENCE (CHEMISTRY) **5076/01, 5078/01**
Paper 1 (Multiple Choice) **15 May 2019**

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, class and register number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **twenty** 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 Answer Sheet.

Read the instructions on the Answer Sheet 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 Data Sheet is printed on page 9.
A copy of the Periodic Table is printed on page 10.
The use of an approved scientific calculator is expected, where appropriate.

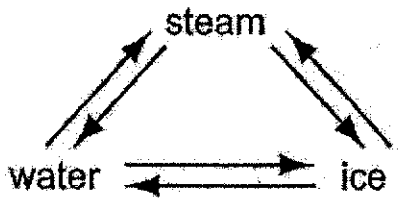
PARENT'S SIGNATURE	For Examiner's Use	
	Total	

This paper consists of **9** printed pages and 1 blank page.
Setter: Mr Tan Kok Heong

1 Which of the statements about the behaviour of the particles in a gas is **not** correct?

A They move in random directions.
B They are arranged in an orderly pattern.
C They are spaced far apart from one another.
D They spread throughout the vessel in which they are contained.

2 In which conversion do water molecules gain speed?



A ice → steam
B steam → ice
C steam → water
D water → ice

3 Three substances have the following properties:

substance 1 is brittle;
substance 2 melts at 8 °C and boils at 180 °C;
substance 3 has a high melting point of 800 °C.

What is the state of each substance at room temperature and pressure?

	substance 1	***substance 2***	***substance 3***
A	gas	liquid	solid
B	solid	gas	solid
C	solid	liquid	solid
D	solid	gas	gas

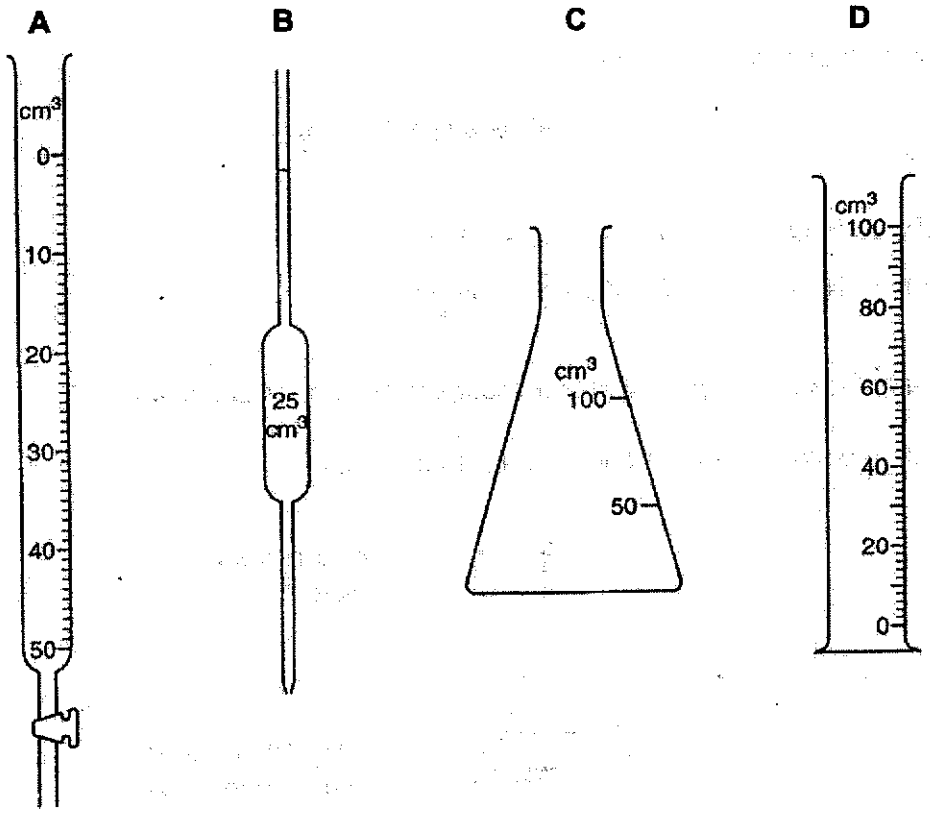
4 The table below lists the properties of oxygen and carbon dioxide.

name of gas	density	solubility of gas
oxygen	slightly denser than air	very slightly soluble
carbon dioxide	denser than air	slightly soluble

Which is the best method to collect each gas?

	oxygen	carbon dioxide
A	displacement of water	downward delivery
B	displacement of water	upward delivery
C	upward delivery	displacement of water
D	upward delivery	downward delivery

5 Which piece of apparatus is most suitable for accurately measuring out 23.45 cm^3 of water?



6 What is the S.I. unit for measuring volume of a liquid?

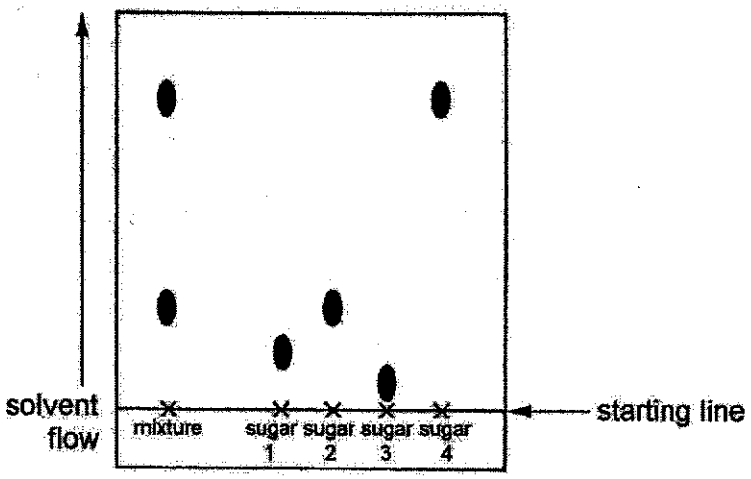
A mm^3
B cm^3
C dm^3
D m^3

7 Copper(II) sulfate crystals can be separated from sand by using the processes shown.

What is the correct order for the processes?

	first →			*last*
A	filter	dissolve	evaporate	crystallise
B	dissolve	evaporate	crystallise	filter
C	dissolve	evaporate	filter	crystallise
D	dissolve	filter	evaporate	crystallise

8 A mixture of two sugars was compared with four different sugars using chromatography. The results are shown in the diagram.



Which two sugars does this mixture contain?

A 1 and 2
B 1 and 4
C 2 and 3
D 2 and 4

9 Which statement about pure sodium chloride, NaCl, is correct?

A It boils over a range of temperatures.
B It decomposes into sodium and chlorine upon heating.
C It melts at a fixed temperature.
D It is insoluble in water.

10 What is the total number of elements present in one unit of chromium(III) picolinate, $Cr(C_6H_4NO_2)_3$?

A 5
B 6
C 17
D 40

11 Which list contains an element, a compound and a mixture?

A Air, carbon dioxide, carbon monoxide
B Air, distilled water, iron filings
C Distilled water, magnesium ribbon, oxygen gas
D Tap water, iron filings, magnesium ribbon

12 Which statement about the particles ${}^{19}_{9}F^-$, ${}^{20}_{10}Ne$ and ${}^{23}_{11}Na^+$ is correct?

A They all contain more electrons than protons.
B They all contain more neutrons than protons.
C They all contain the same number of electrons.
D They all contain the same number of protons.

13 A particle has 10 electrons, 7 protons and 8 neutrons.

What is the symbol for the particle?

A N^{3-}
B O^{2-}
C F^-
D Ne

14 The atoms of element **X** have the electronic configuration 2, 8, 6.

Which statement about element **X** is correct?

A It forms an ionic compound with sodium.
B It forms an ion of charge 2+.
C It has 6 protons in the outer shell of an atom.
D It only reacts with non-metals.

15 Which statement about isotopes of the same element is correct?

A They have different atomic numbers.
B They have different chemical reactivities.
C They have different nucleon numbers.
D They have different numbers of electrons.

16 Which statement describes the formation of a fluoride ion from a fluorine atom?

A The atom gains one electron.
B The atom gains two electrons.
C The atom loses one electron.
D The atom loses two electrons.

17 What is the correct formula of ammonium sulfate?

A NH_3SO_4
B $NH_4(SO_4)_2$
C $(NH_3)_2SO_4$
D $(NH_4)_2SO_4$

18 The elements **X** and **Y** form the compound X_2Y.

What is the correct electronic configuration of the atoms **X** and **Y**?

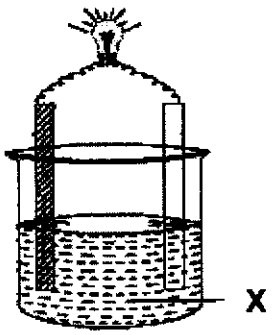
	electronic configuration	
	atom of **X**	atom of **Y**
A	2, 1	2, 7
B	2, 2	2, 7
C	2, 1	2, 6
D	2, 2	2, 6

19 Which two elements combine to form an ionic compound?

A carbon and oxygen
B calcium and fluorine
C hydrogen and fluorine
D nitrogen and oxygen

20 The diagram below shows an experimental setup. In this experiment, the lamp lights up once water is added to substance **X**.

Which is most likely to be the identity of substance **X**?



A kerosene
B sodium chloride
C sugar
D sulfur

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DATA SHEET

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
lead(II) hydroxide	white
zinc hydroxide	white

The Periodic Table of Elements

Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		Key: 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
11 Na sodium 23	12 Mg magnesium 24											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
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 –		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
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^3 at room temperature and pressure (r.t.p.).

Class	Register No.

Candidate Name_____

PEIRCE SECONDARY SCHOOL
MID-YEAR EXAMINATION 2019
SECONDARY THREE EXPRESS

SCIENCE (CHEMISTRY) **5076/03, 5078/03**
Paper 3 **7 May 2019**

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number.
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 any **two** questions.
Write your answers in the spaces provided on the question paper.

A copy of the Data Sheet is printed on page 17.
A copy of the Periodic Table is printed on page 18.

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.

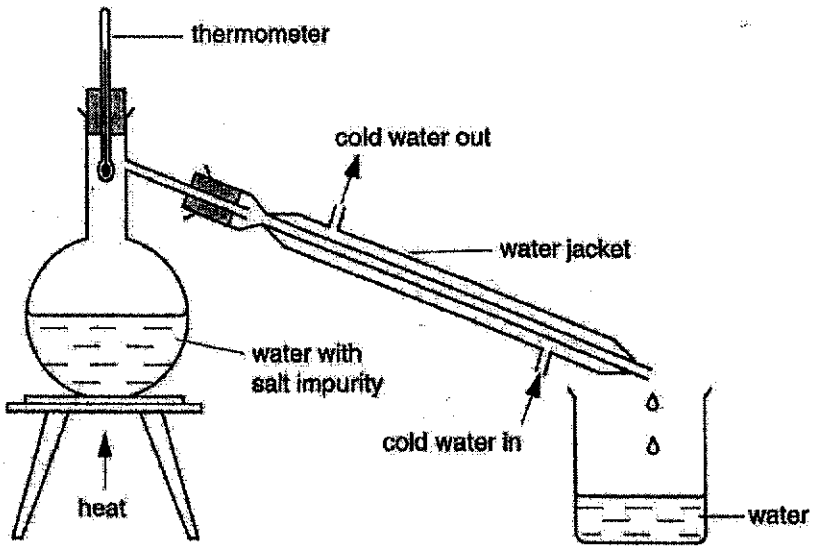
PARENT'S SIGNATURE

For Examiner's Use	
Section A	
Section B	
Total	

Section A [45 marks]

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

1 A sample of water contains salt as an impurity. The apparatus shown below is used to produce pure water from the sample.



(a) **(i)** Name the method of purification.

_____ [1]

(ii) Suggest the purpose of the water jacket.

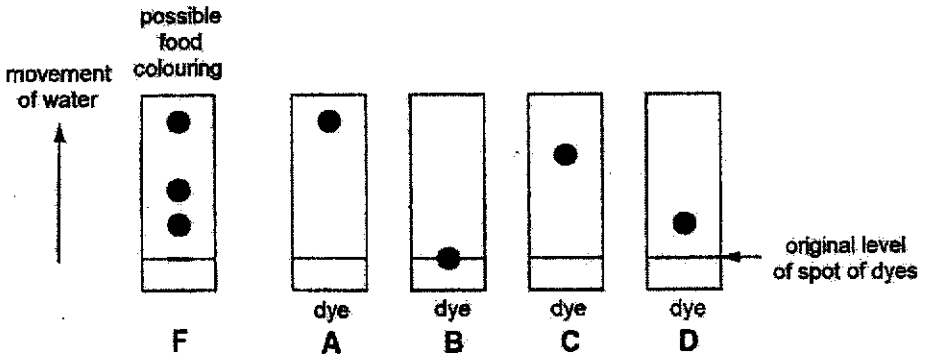
_____ [1]

(b) What would be the reading on the thermometer during the purification?

_____ [1]

(c) Draw a cross (×) on the diagram where the salt would be left after purification is complete. [1]

2 **F** is a mixture of dyes. It has been suggested that **F** might be used as a food colouring. Paper chromatography was used to identify the dyes in **F**. The resulting chromatograms are shown below. Dyes **A** and **C** have a bad effect on some people.



(a) Which of the dyes **A**, **B**, **C** and **D** are present in **F**?

_____ [1]

(b) Suggest which of the dyes is insoluble in water.

_____ [1]

(c) Suggest why the mixture **F** should **not** be used as a food colouring.

_____

_____ [1]

(d) Dye **B** contains two components. Suggest how you could change this chromatographic technique so as to separate these components.

_____

_____ [1]

3 Using Kinetic Particle Theory, explain why

(a) a solid has more mass than the same volume of gas;

_____

_____

_____

_____ [1]

(b) a gas is easier to compress than a solid;

_____

_____

_____

_____ [1]

(c) a liquid takes the shape of its container but a solid does not.

_____

_____

_____

_____ [1]

4 Use the data in the table to answer the questions that follows.

chemical name	melting point/°C	boiling point/°C	chemical formula
ethanol	−114	78	C_2H_5OH
hydrogen	−259	−253	H_2
hydrogen chloride	−114	−85	HCl
iodine	114	183	I_2
oxygen	−219	−183	O_2

(a) Which chemical is a liquid at a temperature of 20 °C?

_____ [1]

(b) Which chemical is a solid at a temperature of 20 °C and a liquid at a temperature of 150 °C?

_____ [1]

(c) Which chemical is a compound containing only two elements?

_____ [1]

(d) **(i)** Which chemical is a gas at a temperature of −200 °C?

_____ [1]

(ii) Which of **A** - **D** best represents the structure of a molecule of the chemical you have named in **(d) (i)**?

_____ [1]

5 Consider the following list of common substances.

air brass copper wire sea water
salt sugar water

Choose from this list a substance which

(a) is a mixture containing both elements and compounds,

_____ [1]

(b) is a mixture of compounds,

_____ [1]

(c) is a mixture of elements,

_____ [1]

(d) is a compound containing only two elements,

_____ [1]

(e) is a compound which contains carbon.

_____ [1]

(f) is an element that can conduct electricity.

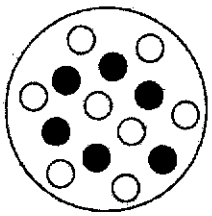
_____ [1]

6 $^{12}_{6}C$ and $^{14}_{6}C$ represent two different carbon isotopes.

(a) What does the number 12 and 14 represent?

_____ [1]

(b) This diagram represents the nucleus in an atom of $^{14}_{6}C$.



Name the particles represent by:

○ _____

● _____ [2]

(c) How many electrons surround the nucleus of an atom of $^{14}_{6}C$?

_____ [1]

(d) Make a similar drawing of the nucleus of an atom of $^{12}_{6}C$.

[1]

7 **(a)** Complete the table

ion	formula	number of protons	number of neutrons	number of electrons
potassium	$^{39}_{19}K^{+}$			
oxide	$^{16}_{8}O^{2-}$			

[3]

(b) In a sample of 100 atoms of potassium, there are 94 atoms of ^{39}K and 6 atoms of ^{41}K.

(i) Explain why these two forms of potassium are isotopes.

_____

_____

_____ [1]

(ii) Find the total mass of the 100 atoms of potassium. Hence find the average relative mass of one atom.

[2]

8 The table shows the atomic structure of six particles, represented by the letters **L** to **Q**. The particles are atoms or ions. The letters are **not** the symbols of the elements.

particle	electrons	protons	neutrons
L	2	2	2
M	6	6	6
N	12	12	12
O	10	12	12
P	6	6	8
Q	10	13	14

Use the letters **L** to **Q** to answer the following questions.

(a) Which two particles are ions?

_____ and _____ [1]

(b) Which particle is an atom of a noble gas?

_____ [1]

(c) Which particle is an atom with a nucleon number of 24?

_____ [1]

(d) Which two particles are an atom and an ion of the same element?

_____ and _____ [1]

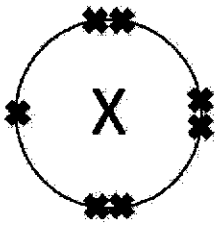
(e) Which two particles are isotopes of the same element?

_____ and _____ [1]

(f) Which particle has the highest atomic mass?

_____ [1]

9 The diagram below shows the valence shell electrons of an atom of element **X**.



(a) What does the term "valence shell" mean?

_____ [1]

(b) To which group of the Periodic Table does **X** belong to?

_____ [1]

(c) **(i)** Predict the type of bonding present in the compound of **X** with sodium.

_____ [1]

(ii) Draw a 'dot and cross' diagram to show the bonding between **X** and sodium. Your diagram should show valence shell only.

[2]

(iii) Write the formula for the compound of element **X** with sodium.

_____ [1]

Section B [20 marks]

Answer any **two** questions from this section in the spaces provided.

10 (a) Name the pieces of apparatus best used to carry out the following procedures.

(i) Add 180 cm^3 of sugar solution to a beaker,

_____ [1]

(ii) Collect and measure the volume of more dense gas such as chlorine,

_____ [1]

(iii) Measure 5.50 g of copper(II) oxide powder,

_____ [1]

(iv) Measure the boiling point of a ethanol,

_____ [1]

(v) Add 18.90 cm^3 of acid to a conical flask.

_____ [1]

(b) Instructions for preparing hydrated crystals of copper(II) sulfate are given below.

> Add excess of copper(II) oxide to 50 cm^3 of dilute sulfuric acid. Stir until copper(II) oxide no longer dissolves in the acid. Filter the mixture. Evaporate the filtrate to about one-third its volume. Allow the filtrate to cool. Filter off the crystals. Wash with cold distilled water. Dry them on filter paper. Do not heat the crystals.

Explain the importance on why the five underlined instructions had to be carried out.

(i) Add excess of copper(II) oxide,

_____

_____ [1]

(ii) Filter the mixture,

_____

_____ [1]

(iii) Evaporate the filtrate to about one-third its volume,

_____

_____ [1]

(iv) Allow the filtrate to cool,

_____

_____ [1]

(v) Do not heat the crystals.

_____

_____ [1]

11 **(a)** In a reaction, magnesium reacts with iron(III) chloride solution to form magnesium chloride solution and iron.

(i) Write the chemical formula for the following solution:

- iron(III) chloride _____ [1]
- magnesium chloride _____ [1]

(ii) State the type of bonding present in magnesium chloride.

_____ [1]

(iii) Describe how the purity of the magnesium chloride can be confirmed.

_____

_____

_____ [1]

(b) The table below shows properties of different gases at room temperature and pressure. Use the information below to answer the following questions.

name of gas	density (g/dm^3)	solubility in water
helium	0.179	insoluble
ammonia	0.681	soluble
bromine vapour	7.14	soluble

Density of air = 1.28 g/dm^3

(i) Sketch the apparatus that you would use to obtain helium from a mixture of helium and ammonia. Explain your choice.

_____

_____

_____ [3]

(ii) Sketch the apparatus that you would use to obtain bromine from a mixture of bromine and ammonia. Explain your choice.

_____

_____

_____ [3]

12 Atoms with two electrons in their valence shell can combine with atoms with seven electrons in their valence shell.

(a) State the type of bonding present between the atoms.

_____ [1]

(b) Draw 'dot and cross' diagrams to show the combination between the atoms, showing valence electrons only. Name the compound formed.

Name _____ [3]

(c) Explain why

(i) molten ionic compounds will conduct electricity in the molten state,

_____

_____

_____ [2]

(ii) ionic compounds have high boiling point.

_____

_____

_____ [2]

(d) Elements with proton numbers 3, 11 and 19 are in the same group of the Periodic Table. For these **three** elements, suggest one similarity and one difference in terms of the electronic structure.

_____

_____

_____ [2]

DATA SHEET

Colours of Some Common Metal Hydroxides

calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
lead(II) hydroxide	white
zinc hydroxide	white

The Periodic Table of Elements

Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											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
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 –		114 Fl flerovium –		116 Lv livermorium –		

Key

proton (atomic) number
atomic symbol
name
relative atomic mass

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^3 at room temperature and pressure (r.t.p.).

PEIRCE SECONDARY SCHOOL
MID-YEAR EXAMINATION 2019
SECONDARY THREE EXPRES
MARKING SCHEME

SCIENCE (CHEMISTRY)
Paper 1 (Multiple Choice)

5076/01
15 May 2019

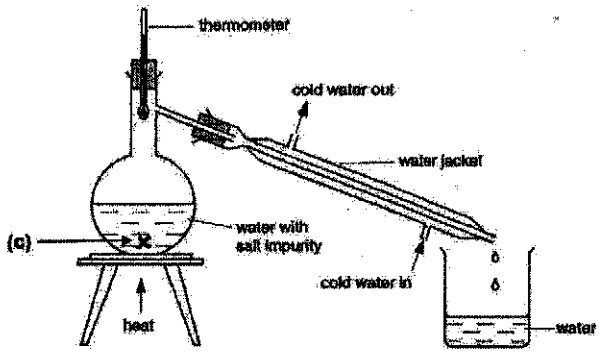
1	2	3	4	5	6	7	8	9	10
B	A	C	A	A	D	D	D	C	A
11	12	13	14	15	16	17	18	19	20
B	C	A	A	C	A	D	C	B	B

Paper 3 (Theory)

5076/03
7 May 2019

S/No	Answers		Remarks
	Section A		
1(a)(i)	Simple distillation	[1]	
1(a)(ii)	To cool/condense the vapour into pure water	[1]	

Setter: Mr Tan Kok Heong

S/No	Answers		Remarks
1(b)	100 °C	[1]	
1(c)		[1]	
2(a)	**A** and **D**	[1]	
2(b)	**B**	[1]	
2(c)	It contains dye **A** which has a bad effect on some people.	[1]	

2(d)	Another solvent such as ethanol instead of water could be used	[1]	
S/No	**Answers**		**Remarks**
3(a)	Solid particles are very closely packed and hence denser, gas particles are spread far apart and less dense. Therefore there are more particles per unit volume in a solid.	[1]	
3(b)	Gas particles have lots of spaces between them as the particles are spread far apart, solid particles are packed very closely together in an orderly manner with hardly any spaces between them.	[1]	
3(c)	Liquid particles slide over each other and flow throughout the liquid, solid particles can only vibrate about its fixed position.	[1]	
4(a)	ethanol	[1]	
4(b)	Iodine	[1]	
4(c)	hydrogen chloride	[1]	
4(d)(I)	Hydrogen	[1]	

4(d)(ii)	B	[1]	
S/No	**Answers**		**Remarks**
5(a)	air	[1]	
5(b)	sea water	[1]	
5(c)	brass	[1]	
5(d)	water/salt	[1]	
5(e)	sugar	[1]	
5(f)	copper wire	[1]	

S/No	Answers		Remarks
6(a)	Nucleon number/mass number/total number of proton and number of neutrons	[1]	
6(b)	○ neutrons ● protons	[2]	
6(c)	6	[1]	
6(d)		[1]	

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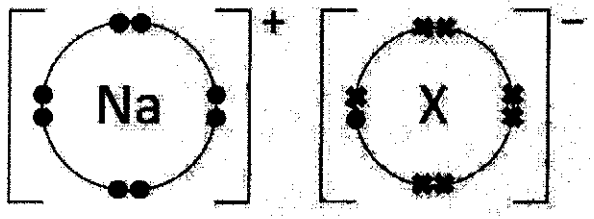
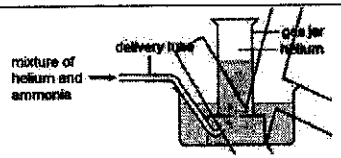
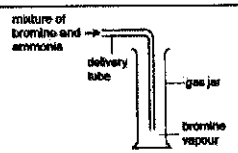
<table>
<tr><th>S/No</th><th>Answers</th><th></th><th>Remarks</th></tr>
<tr><td>7(a)</td><td>
<table>
<tr><th>ion</th><th>formula</th><th>number of protons</th><th>number of neutrons</th><th>number of electrons</th></tr>
<tr><td>potassium</td><td>$^{39}_{19}K^{+}$</td><td>19</td><td>20</td><td>18</td></tr>
<tr><td>oxide</td><td>$^{16}_{8}O^{2-}$</td><td>8</td><td>8</td><td>10</td></tr>
</table>
</td><td>[3]</td><td></td></tr>
<tr><td>7(b)(i)</td><td>This is because they are both atoms of the same element with the same number of protons but different number of neutrons.</td><td>[1]</td><td></td></tr>
<tr><td>7(b)(ii)</td><td>Mass of 100 atoms of K = (94 × 39) + (6 × 41) = 3912
Average relative mass of K = 3912 ÷ 100 = 39.1</td><td>[2]</td><td></td></tr>
</table>

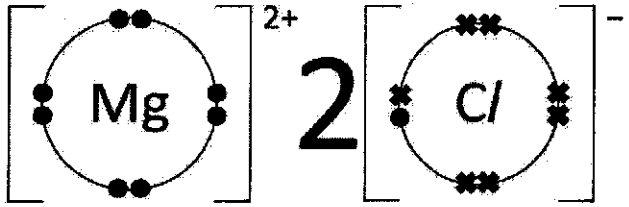
S/No	Answers		Remarks
8(a)	**O** and **Q**	[1]	
8(b)	**L**	[1]	
8(c)	**N**	[1]	
8(d)	**N** and **O**	[1]	
8(e)	**M** and **P**	[1]	
8(f)	**Q**	[1]	

S/No	Answers		Remarks
9(a)	It refers to the outer electron shell	[1]	
9(b)	Group VII	[1]	
9(c)(i)	Ionic bonding	[1]	
9(c)(ii)		[2]	
9(c)(iii)	NaX	[1]	

S/No	Answers		Remarks
	Section B		
10(a)(i)	Measuring cylinder	[1]	
10(a)(ii)	Gas syringe	[1]	
10(a)(iii)	Electronic balance	[1]	
10(a)(iv)	Thermometer	[1]	
10(a)(v)	Burette	[1]	

S/No	Answers		Remarks
10(b)(i)	Ensure all the sulfuric acid has been completely reacted or used up.	[1]	
10(b)(ii)	Separate the excess/unreacted copper(II) oxide from the mixture.	[1]	
10(b)(iii)	Obtain a saturated solution.	[1]	
10(b)(iv)	Allow crystals of copper(II) sulfate to form through slow cooling.	[1]	
10(b)(v)	Ensure crystals of copper(II) sulfate do not decompose.	[1]	

S/No	Answers		Remarks
11(a)(i)	• iron(III) chloride $\underline{FeCl_3}$ • magnesium chloride $\underline{MgCl_2}$	[2]	
11(a)(ii)	Ionic bonding	[1]	
11(a)(iii)	The melting point of magnesium chloride can be tested to see if it is a constant.	[1]	
11(b)(i)	 Displacement of water is used as helium is insoluble in water while ammonia is soluble in water.	[3]	[1] for drawing [1] for labels [1] for explanation
11(b)(ii)	 Downward delivery is used as bromine vapour is denser than air, hence it will sink while ammonia is less denser than air and will escape out of the gas jar.	[3]	[1] for drawing [1] for labels [1] for explanation

S/No	Answers		Remarks
12(a)	Ionic bonding	[1]	
12(b)	 magnesium chloride [1]	[3]	Choice of positive and negative ions can be any Gp II and VII elements respectively. [1] per ion, for negative ion it must be stated that 2 ions are required to score the mark
12(c)(i)	Molten ionic compounds have mobile ions [1]; these free-moving positive and negative ions act as charge carriers that can conduct electricity [1].	[2]	
12(c)(ii)	There are strong electrostatic forces of attraction between the oppositely charged ions [1], hence a large amount of energy is required to overcome them [1].	[2]	
12(d)	These three elements have 1 valence (outer) electron [1] but different number of electron shells [1].	[2]	