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Geylang Methodist School (Secondary) Mid-Year Examination 2018

Candidate
Name

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Class

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Index Number

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SCIENCE(CHEMISTRY)

5105/5107/03

Paper 3 Multiple Choice

Sec 4 Normal (A)

Additional Materials : OAS

Papers 3 & 4: 1 hour 15 minutes

Setter : Mr Iskander

3 May 2018

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, class and register number on the Optical Answer Sheet in the spaces provided.

There are **twenty** questions in this section. Answer **all** questions. For each question, there are four possible answers, **A, B, C** or **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Optical Answer Sheet.

Read the instructions on the Optical Answer Sheet very carefully.

Answers to Paper 3 and Paper 4 must be handed in separately.

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

You are advised to spend no more than **30 minutes** on **Paper 3**.

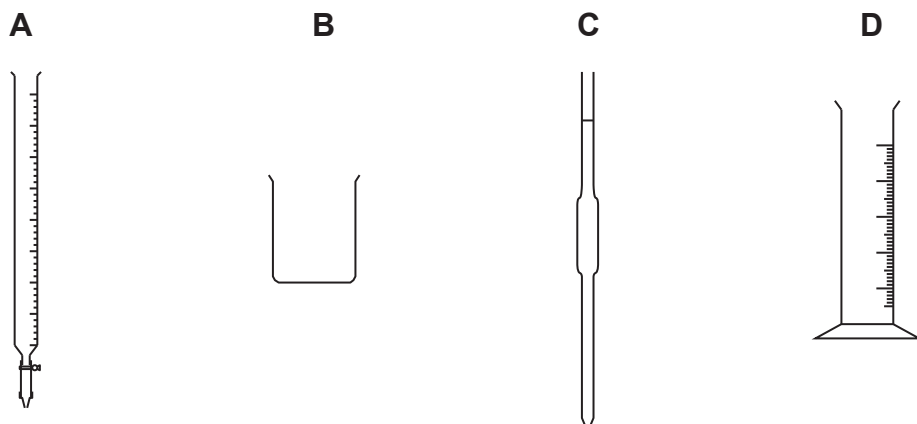
You may proceed to answer Paper 4 as soon as you have completed Paper 3.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 8.

Section A

- 1 Which apparatus is most suitable for measuring 26.1 cm^3 of liquid?

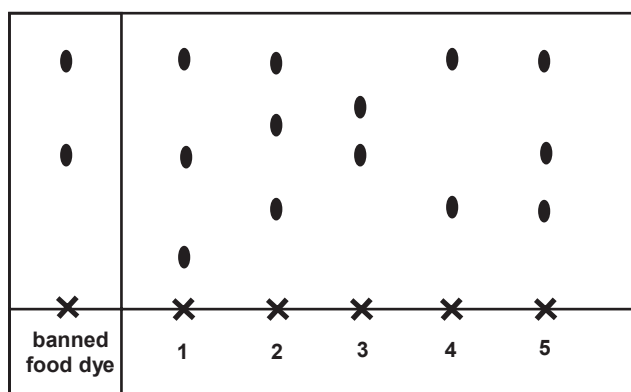


- 2 The table below shows the melting and boiling points of four different substances.

Which substance is a gas at 0°C ?

substance	melting point / $^\circ\text{C}$	boiling point / $^\circ\text{C}$
A	25	79
B	-3	96
C	12	43
D	-25	-5

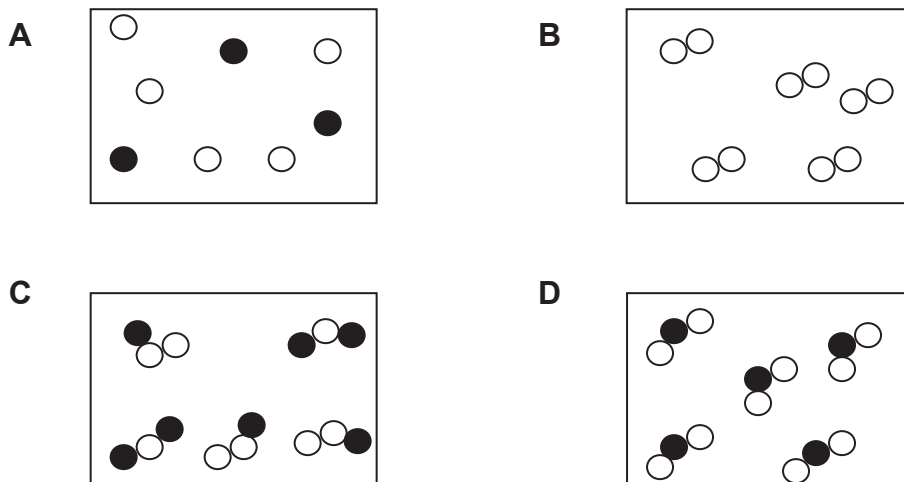
- 3 The diagram shows a chromatogram obtained by using a banned food dye.



Which **two** food dyes contain the banned food dye?

- A** 1 and 5
B 1 and 3
C 2 and 4
D 2 and 5

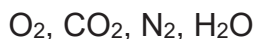
- 4 Which of the following diagrams shows a mixture of elements?



- 5 Scientists recently discovered a new element. The symbol of this new element is $^{234}_{104}\text{Y}$.

How many electrons does one atom of Y contain?

- A** 100 **B** 104
C 130 **D** 234
- 6 The following gases can be found in the atmosphere.



Which of these covalent compounds has the most number of shared electrons?

- A** O_2 **B** CO_2
C N_2 **D** H_2O
- 7 Which feature of sodium chloride solution enables it to conduct electricity?
- A** The ions are mobile in the solution.
B The ions are packed closely together.
C The electrons are able to move freely.
D The solution contains moving molecules.

-

● = carbon
 ● = oxygen
 ○ = hydrogen

A	9
C	40

B	26
D	46

- A** 0.1 mol
C 0.5 mol

B 0.2 mol
D 6×10^{23}

- $$pK(s) + qH_2O(l) \rightarrow rKOH(aq) + sH_2(g)$$

	p	q	r	s
A	1	2	3	3
B	1	3	2	3
C	2	2	2	1
D	2	3	1	2

- A** Group 0 elements are unreactive metals.
B Group I elements form covalent chlorides.
C Group VII elements form negative ions.
D The elements become more metallic from left to right across a period.

- 12** Caesium is in the same group of the Periodic Table as sodium and potassium. Which of the following is a property of caesium?

A It forms an acidic oxide.
B It does not conduct electricity.
C It has high density and high melting point.
D It produces hydrogen when reacting with water.

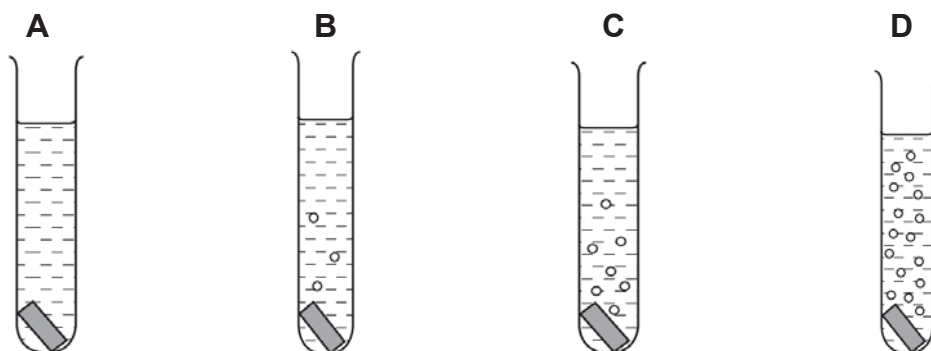
- 13** Fluorine is the first element in Group VII of the Periodic Table.

Which statement about fluorine is **NOT** correct?

A Fluorine exists as diatomic molecules.
B Fluorine forms negative ions.
C Fluorine is less reactive than chlorine.
D Fluorine is pale yellow.

- 14** Pieces of copper, iron, magnesium and zinc are added to separate test-tubes containing dilute hydrochloric acid.

Which test-tube contains magnesium and dilute hydrochloric acid?



- | experiment | <i>X</i> | <i>Y</i> | <i>Z</i> |
|--|----------|----------|----------|
| metal produces hydrogen gas when reacting with hydrochloric acid | yes | no | yes |
| metal can be displaced by iron from its salt solution | yes | yes | no |

	most reactive	→	least reactive
A	X		Z
B	Y		X
C	Z		Y
D	Z		X

- | | | | |
|----------|---|----------|---|
| A | 1 | B | 5 |
| C | 7 | D | 9 |

- A** Lead and sodium chloride solution
B Lead (II) oxide and dilute hydrochloric acid
C Lead (II) nitrate solution and dilute hydrochloric acid
D Lead (II) sulfate and sodium chloride solution

- Which row is correct?

	the soil in the garden is	cabbages grow best in soil that is	calcium hydroxide is
A	weakly acidic	strongly alkaline	alkaline
B	weakly acidic	weakly alkaline	alkaline
C	weakly alkaline	strongly acidic	acidic
D	weakly alkaline	weakly acidic	acidic

- 19** The oxide of an element **M** was added separately to dilute nitric acid and aqueous sodium hydroxide. The word equations for the reactions are shown.

- 1 **M** oxide + nitric acid → **M** nitrate + water
2 **M** oxide + sodium hydroxide → no reaction

Which row describes **M** and its oxide?

	M	oxide of M
A	metal	amphoteric
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

- 20** Which two gases are pollutants of the atmosphere?

- A** carbon dioxide and nitrogen
B carbon monoxide and oxygen
C carbon monoxide and sulfur dioxide
D nitrogen and oxygen

End of Paper 3

8

actinoids

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

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Geylang Methodist School (Secondary) Mid-Year Examination 2018

Candidate
Name

Class

Index Number

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SCIENCE(CHEMISTRY)

5105/5107/04

Paper 4 Chemistry

Sec 4 Normal (A)

No additional materials required

Papers 3 & 4: 1 hour 15 minutes

Setter : Mr Iskander

3 May 2018

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.

Write in dark blue or black pen on both sides of the paper.

You may use a soft pencil for any diagrams or graphs.

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

Answer **all** questions in Section A and any **two** questions in Section B.

Enter the numbers of the Section B questions you have answered on the dotted lines in the grid below.

You are advised to spend no longer than 30 minutes on Paper 3.

You may proceed to answer Paper 4 as soon as you have completed Paper 3.

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

At the end of the examination hand in your answers to Paper 3 and Paper 4 separately.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Section A	/ 14
Section B	
.....	/ 8
.....	/ 8
Total	/30

Section A

Answer **ALL** questions from this section in the spaces provided.

- 1 Refer to the list of substances and answer the questions.

silver chloride

calcium oxide

carbon dioxide

ammonia

zinc oxide

sodium chloride

Each substance can be used once, more than once or not at all.

Name the substance(s) which

- (a) can be prepared by precipitation method.

.....[1]

- (b) can be collected by the downward displacement of air.

.....[1]

- (c) can react with both acid and alkali.

.....[1]

- (d) is added to soil to increase the pH.

.....[1]

- 2 The table shows the percentage of carbon dioxide in the atmospheres of three planets **A**, **B** and **C**, in the solar system.

Planet	percentage of carbon dioxide
A	20
B	0.03
C	75

- (a) State which planet, **A**, **B** or **C**, is the Earth.

.....[1]

- (b) On Earth, volcanoes emit many gases into the atmosphere during volcanic eruptions. State which air pollutant is emitted and how it affects human health.

.....
 [2]

- (c) The use of motor vehicles causes increased levels of the pollutant carbon monoxide, especially in large cities.

- (i) Explain briefly why the use of motor vehicles causes increased levels of carbon monoxide.

..... [1]

- (ii) Explain why high levels of carbon monoxide in cities are undesirable.

..... [1]

- 3 (a) Complete the table.

element	proton number	arrangement of electrons
lithium	3	
sodium		2.8.1
aluminium		

[1]

- (b) Explain why aluminium is in a different group from lithium and sodium.

.....
 [2]

- (c) Sodium reacts with fluorine to form the salt sodium fluoride, NaF.

Use 'dot-and-cross' diagram to show the electronic structure of sodium fluoride. Show only the outer shell electrons.

[2]

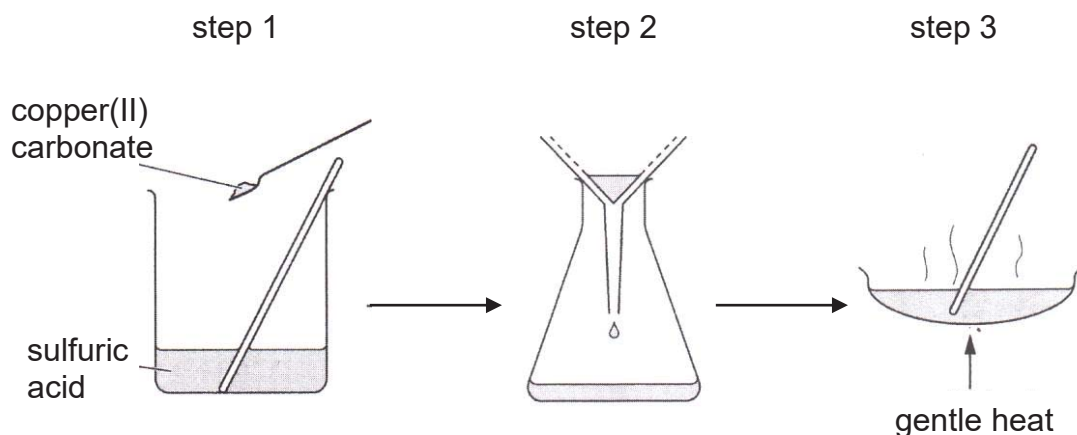
End of Section A

Section B

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

- 4** Crystals of copper(II) sulfate, CuSO_4 , can be made by reacting dilute sulfuric acid, H_2SO_4 with excess of powdered copper(II) carbonate, CuCO_3 .

The diagram shows the first three steps used to prepare crystals of this salt.



- (a) (i)** Name the processes being used in step 2 and step 3.

process used in step 2 is.....

process used in step 3 is..... [1]

- (ii)** Explain why step 3 is carried out.

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

- (b)** The liquid from step 3 is allowed to stand for some time to allow the crystals to grow.
Describe the next step needed in order to produce a sample of dry copper(II) sulfate crystals.

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

- (c) (i) During step1, a gas is given off.

Name the gas and describe a positive test to identify the gas.

name of the gas.....

test for gas.....

.....[2]

- (ii) Write a balanced chemical equation for the reaction between dilute sulfuric acid and copper(II) carbonate.

.....[1]

- (d) At the start of the experiment there is 24.8 g of copper(II) carbonate.

Calculate the number of moles of 24.8 g of copper(II) carbonate.

amount of copper(II) carbonate = mol [2]

- 5 (a) To which period of the Periodic Table does the element iron belong?

.....[1]

- (b) The symbols for two isotopes of iron are shown below.



- (i) How do these two isotopes differ in their atomic structure?

.....[1]

- (ii) State the number of nucleons present in an atom of the isotope



.....[1]

- (iii) State the number of electrons present in an atom of the isotopes



.....[1]

- (c) Four metal strips of same mass, **W**, **X**, **Y** and **Z**, were added into separate test tubes of cold water. The time taken for the metal strips to react completely are recorded in **Table 5.1**.

metal cube	W	X	Y	Z
time taken to react completely / s	80	30	0	50

Table 5.1

- (i) Place the four metals in order of their reactivity.

most reactive:

.....

.....

Least reactive:

[1]

- (ii) Which metal strips, **W**, **X**, **Y** and **Z**, could be potassium and iron respectively?

potassium

iron [1]

- (d) Some baked bean cans are made of iron coated with a layer of tin to prevent rusting. If this coating is scratched then the iron underneath starts to rust.

Name the element and the compound which react with the iron to form rust.

element

compound [2]

6 Fluorine, Chlorine, Bromine and Iodine are Group VII elements.

- (a) Complete the table below to show the trend in Group VII elements.

name	molecular formula	state	colour
fluorine	F ₂		
chlorine	Cl ₂	gas	yellowish-Green
bromine		liquid	red
iodine	I ₂	solid	black

[1]

- (b) How many electrons are there in the outer shell of a bromine atom? State a reason for your answer.

.....

.....[2]

- (c) Describe the colour change when gaseous chlorine is bubbled into a colourless solution of potassium bromide. Explain the reason for your observation.

.....

.....[2]

- (d) Write a balanced chemical equation for the reaction in (c)

.....[1]

- (e) Describe the **arrangement** and **movement** of the particles of chlorine and bromine at room temperature.

substance	arrangement	movement
chlorine		
bromine		

[2]

End of Paper

9

actinoids

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

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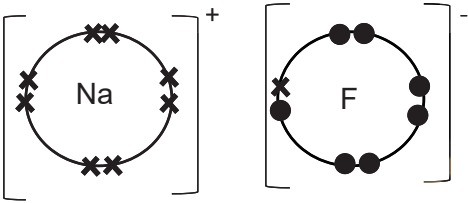
Geylang Methodist School (Secondary)
Mid Year Examination 2018
SCIENCE(CHEM) 4NA
ANSWER SCHEME

Paper 3

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

Paper 4 Section A

1(a)	silver chloride	1												
1(b)	Ammonia	1												
1(c)	Zinc oxide	1												
1(d)	Calcium oxide	1												
2(a)	B	1												
2(b)	Sulfur dioxide is emitted. It irritates the eyes / causes breathing problem / respiratory problem.	1 1												
2(c)(i)	The increase use of motor vehicle will cause an increase of incomplete combustion of petrol	1												
2(c)(ii)	High levels of carbon monoxide will combine with haemoglobin in the blood to prevent absorption of oxygen. Or cause dizziness and respiratory difficulties to human.	1												
3(a)	<table border="1"> <thead> <tr> <th>element</th><th>proton number</th><th>Arrangement of electrons</th></tr> </thead> <tbody> <tr> <td>lithium</td><td>3</td><td>2.1</td></tr> <tr> <td>sodium</td><td>11</td><td>2.8.1</td></tr> <tr> <td>aluminium</td><td>13</td><td>2.8.3</td></tr> </tbody> </table> (½ m 2 correct answers)	element	proton number	Arrangement of electrons	lithium	3	2.1	sodium	11	2.8.1	aluminium	13	2.8.3	1
element	proton number	Arrangement of electrons												
lithium	3	2.1												
sodium	11	2.8.1												
aluminium	13	2.8.3												
3(b)	It has 3 valence electrons [1] while lithium and sodium have 1 valence electron.[1] Thus it will be placed in group 3.	2												

3(c)	 (1m – correct type of bond with charge; 1m – correct electrons drawn)	2
------	--	---

Paper 4 Section

4(a)(i)	Step 2: filtration [1] Step 3 : evaporation[1]	2
4(a)(ii)	To obtain a saturated solution	1
4(b)	Filter, rinse crystals with some distilled water [$\frac{1}{2}$] and dry between pieces of filter paper.[$\frac{1}{2}$]	1
4(c)(i)	Carbon dioxide[1] Forms white precipitate with limewater[1]	2
4(c)(ii)	$\text{CuCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{CO}_2 + \text{H}_2\text{O}$	1
4(d)	M_r of $\text{CuCO}_3 = 64 + 12 + 16 \times 3 = 124$ [1] Mole of $\text{CuCO}_3 = 24.8 \div 124 = 0.200$ (3 sf) mol [1]	2
5(a)	Period 4	1
5(b)(i)	<u>They have different number of neutrons in their nucleus</u>	1
5(b)(ii)	57	1
5(b)(iii)	26	1
5(c)(i)	Order of Reactivity ; X , Z, W, Y	1
5(c)(ii)	Potassium is X and iron is W ($\frac{1}{2}$ m each correct answer)	1
5(d)	Element: Oxygen Compound: water	1 1

6(a)	<table><tr><th>Name</th><th>Molecular Formula</th><th>State</th><th>Colour</th></tr><tr><td>Fluorine</td><td>F₂</td><td>gas</td><td>Pale yellow</td></tr><tr><td>Chlorine</td><td>Cl₂</td><td>Gas</td><td>Yellowish-Green</td></tr><tr><td>Bromine</td><td>Br₂</td><td>Liquid</td><td>Red</td></tr><tr><td>Iodine</td><td>I₂</td><td>Solid</td><td>Black</td></tr></table> (All 3 correct answer 1 m; 2 correct answers ½ m; 1 or no correct answer 0 m)	Name	Molecular Formula	State	Colour	Fluorine	F ₂	gas	Pale yellow	Chlorine	Cl ₂	Gas	Yellowish-Green	Bromine	Br ₂	Liquid	Red	Iodine	I ₂	Solid	Black	1
Name	Molecular Formula	State	Colour																			
Fluorine	F ₂	gas	Pale yellow																			
Chlorine	Cl ₂	Gas	Yellowish-Green																			
Bromine	Br ₂	Liquid	Red																			
Iodine	I ₂	Solid	Black																			
6(b)	7 outermost shell electrons[1] Bromine is in Group VII [1]	2																				
6(c)	Solution changes from colourless to red/red-brown. [1] As Cl ₂ more reactive than bromine, it displaces bromide ions in KBr to form bromine solution.[1]	2																				
6(d)	Cl ₂ + 2KBr → Br ₂ + 2KCl (½ m correct formula and ½ m for balancing equation correctly)	1																				
6(e)	<table><tr><th>Substance</th><th>Arrangement</th><th>Movement</th></tr><tr><td>chlorine</td><td>Particles are far apart. [½]</td><td>Particles move quickly and randomly.[½]</td></tr><tr><td>bromine</td><td>Particles are closely packed but no fixed order. [½]</td><td>Particles are able to slide past one another freely.[½]</td></tr></table>	Substance	Arrangement	Movement	chlorine	Particles are far apart. [½]	Particles move quickly and randomly.[½]	bromine	Particles are closely packed but no fixed order. [½]	Particles are able to slide past one another freely.[½]	2											
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