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**REGENT SECONDARY SCHOOL
END OF YEAR EXAMINATION 2019
SECONDARY THREE (EXPRESS)**

NAME: _____

INDEX NUMBER: _____

CLASS: _____

SETTER: MR TEO CA

SCIENCE (CHEMISTRY, BIOLOGY)

5078/01

Paper 1 Multiple Choice

10 October 2019

1 hour

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 index number on the Answer Sheet 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 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 Periodic Table is printed on page .

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

40	TARGET
PARENT'S SIGNATURE	

This document consists of 12 printed pages.

- 1 Titration is carried out to produce sodium chloride by titrating sodium hydroxide to 25.0 cm³ of hydrochloric acid. Which of the apparatus below is used to add sodium hydroxide drop wise into hydrochloric acid?

- A burette
- B measuring cylinder
- C pipette
- D thermometer

- 2 Measurements are made on some pure water.

its boiling point, b.p.
 its freezing point, f.p.
 its pH

Sodium chloride is then dissolved in the water and the measurements repeated.

Which correctly shows the measured values that will change?

✓ - change

x - no change

	boiling point	freezing point	pH
A	✓	✓	✓
B	✓	✓	x
C	x	x	✓
D	x	x	x

3

- 3 The diagram shows a chromatogram obtained from three sweets, X, Y and Z.

● yellow ● red	● red ● yellow	● red ● yellow ● red
sweet X	sweet Y	sweet Z

How many different dyes are present in the sweets?

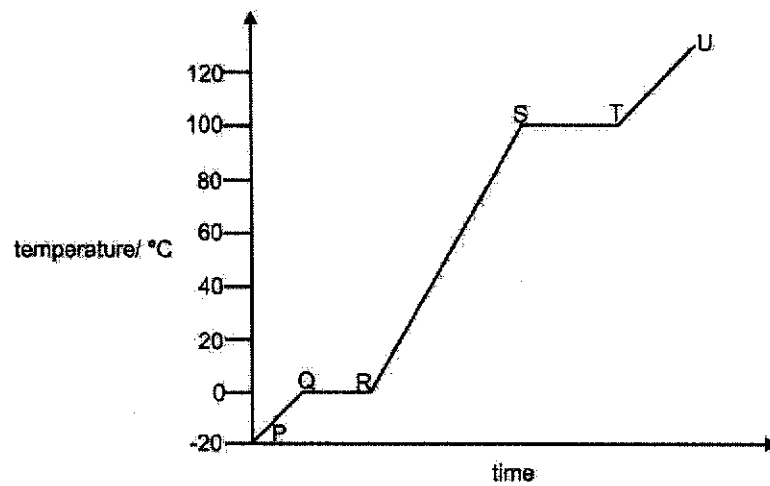
- A 1
- B 2
- C 3
- D 4
- 4 The boiling points of some elements are given below.

element	boiling point / °C
nitrogen	-196
xenon	-108
fluorine	-188

The three gases are liquefied at -200 °C and are separated by fractional distillation. When the temperature is increased by 50 °C, which substance(s) would remain in liquid state?

- A fluorine
- B nitrogen
- C xenon
- D nitrogen and fluorine

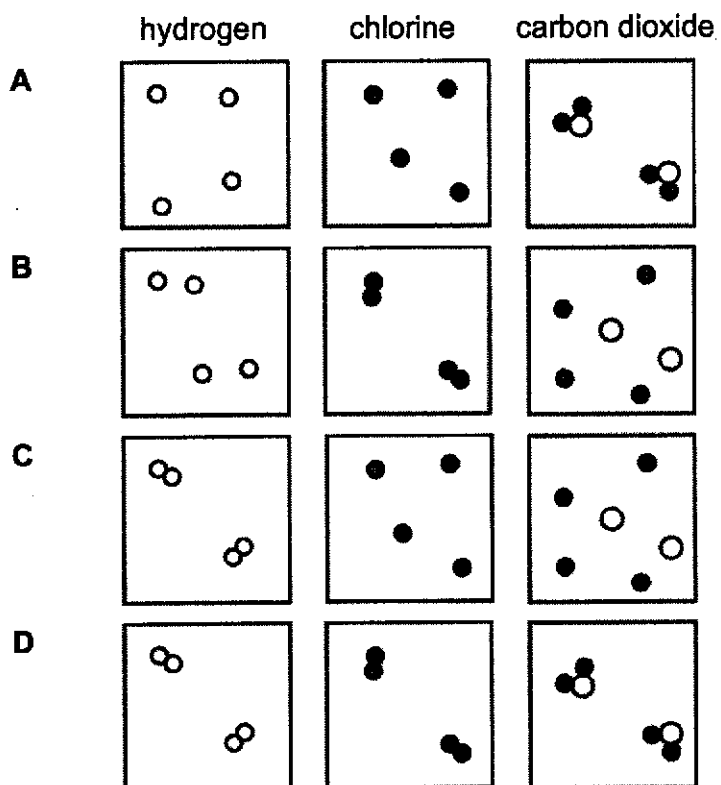
- 5 The graph shows the change in temperature with time when ice at -20°C is heated to 120°C .



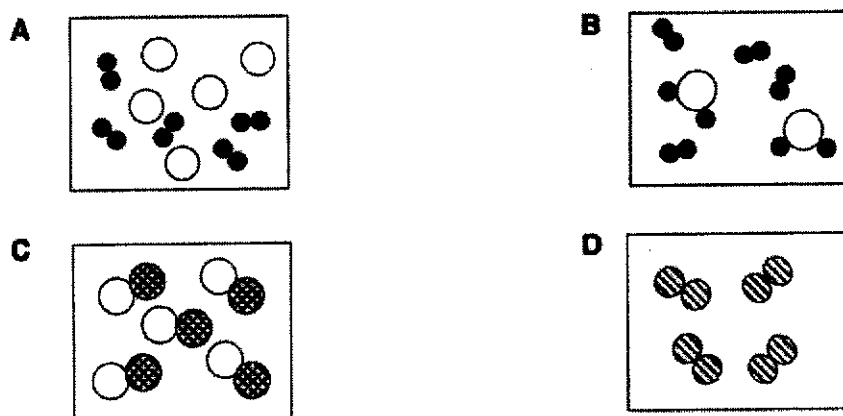
Which of the following shows the correct change taking place between the points?

	points	change
A	P to Q	average energy of particles remains constant
B	Q to R	ice melting
C	R to S	the volume of steam is increasing
D	T to U	water boiling

- 6 Which of the following diagrams shows the molecules of hydrogen gas, chlorine gas and carbon dioxide gas?



- 7 Which one of the following diagrams represents particles in a mixture of elements?



6

- 8 Two particles **G** and **H** have the composition shown in the table.

particle	number of electrons	number of neutrons	number of protons
G	10	6	6
H	10	10	9

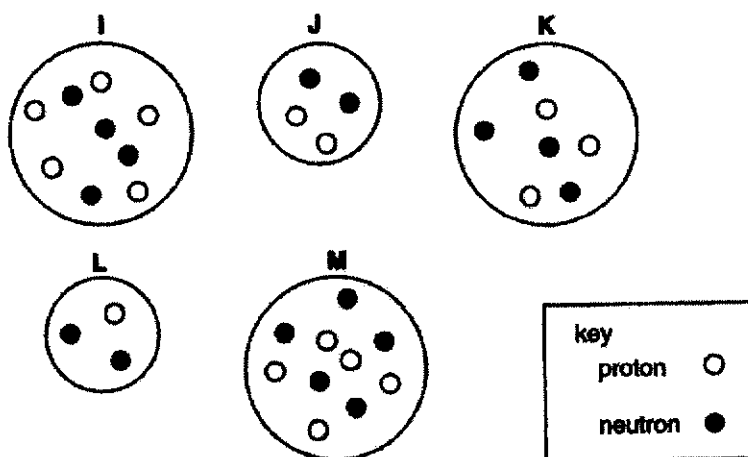
The particles **G** and **H** are

- A** metal atoms.
 - B** non-metal atoms.
 - C** negative ions.
 - D** positive ions.
- 9 An element **Y** forms a negative ion with the electronic structure 2,8,8.

What could be the proton number (atomic number) of **Y**?

- A** 17
- B** 18
- C** 19
- D** 20

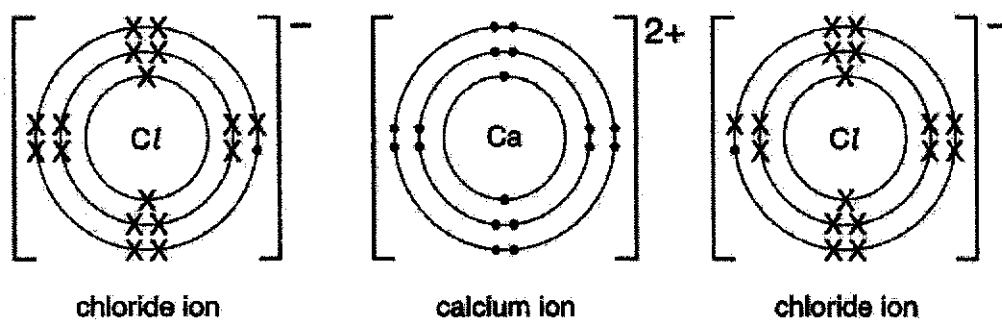
- 10 The diagram below shows the nuclei of five different atoms. The nuclei are labelled I, J, K, L and M.



Which two elements are isotopes?

- A atoms I and M
 B atoms J and L
 C atoms K and I
 D atoms K and M
- 11 An element R reacts with chlorine to form a substance of formula RCl_3 . The substance is a liquid at room temperature and boils at 50°C .
 What could be the electronic configuration of R?
- A 2.1
 B 2.3
 C 2.8.5
 D 2.8.7

- 12 Which of the following pairs of elements will form a compound by sharing electrons?
- A calcium and chlorine
 - B carbon and chlorine
 - C magnesium and oxygen
 - D sodium and sulfur
- 13 Which of the following statements is true for the compound shown in the diagram below?



- A The compound formed has a low melting point.
 - B The compound formed is a good conductor of electricity at room temperature and pressure.
 - C The calcium atom shares one electron each with two chloride ions.
 - D The calcium atom transfers one electron each to two chloride ions.
- 14 Element X has a proton number of 13. Element Y has a proton number of 9. What is the chemical formula of the compound formed when X and Y react?
- A XY
 - B XY₃
 - C X₃Y
 - D X₃Y₂

- 15 Three solids, **P**, **Q** and **R**, all react with dilute sulfuric acid to produce zinc sulfate. **P** and **R** produce gases during the reaction. The gas produced when **P** reacts will not burn. The gas produced when **R** reacts will burn.

What are **P**, **Q** and **R**?

	P	Q	R
A	zinc	zinc hydroxide	zinc carbonate
B	zinc carbonate	zinc	zinc oxide
C	zinc carbonate	zinc hydroxide	zinc
D	zinc oxide	zinc carbonate	zinc

- 16 The chart shows the colour ranges of four different indicators. Which indicator is blue in an acidic solution?

indicator	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 —													

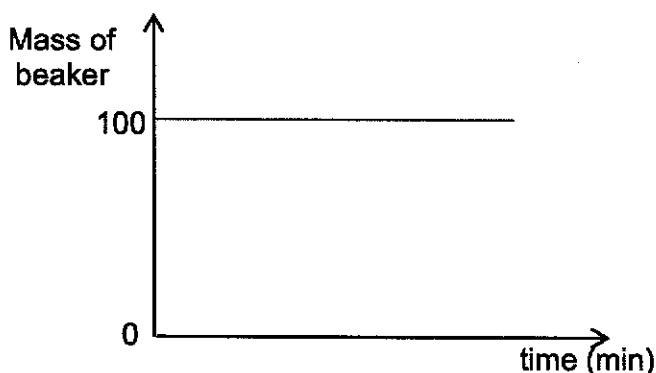
17 You are supplied with dilute hydrochloric acid together with

- copper solid,
- magnesium solid,
- aqueous lead nitrate,
- aqueous silver nitrate.

How many different soluble chlorides could you make?

- A 1
B 2
C 3
D 4

18 Two substances **P** and **Q** are mixed in a beaker and the initial total mass is 100g. The mass of the beaker and its contents are recorded at regular intervals and the results obtained are shown in the graph below.



Which pair shows possible identities of the substances **P** and **Q**?

- A ammonium chloride and dilute sodium hydroxide
B calcium carbonate and dilute nitric acid
C copper and dilute sulfuric acid
D zinc and dilute hydrochloric acid

- 19** Which Group I element reacts most violently with water?
- A** lithium
 - B** potassium
 - C** rubidium
 - D** sodium
- 20** Which statement about the Periodic Table is correct?
- A** All the elements in the same group have the same number of electrons.
 - B** The melting points of the elements in Group I increase down the group.
 - C** All elements in the same period have the same number of electron shells.
 - D** All the elements are arranged according to increasing number of neutrons and protons.



**REGENT SECONDARY SCHOOL
END YEAR EXAMINATION 2019
SECONDARY THREE EXPRESS**

NAME: _____

INDEX NUMBER: _____

CLASS: _____

SETTER : MR TEO CA

SCIENCE (CHEMISTRY,BIOLOGY)

Paper 3 Chemistry

5078/03

04 October 2019

1 hour 15 minutes

Candidates answer on the Question Paper
No Additional Materials are required

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work 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 **all** questions.

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

A copy of the Periodic Table is printed on page 16.

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.

65	TARGET
PARENT'S SIGNATURE	

This document consists of 16 printed pages.

Section A [45 marks]Answer **all** questions in the spaces provided.

- 1** Choose from the following compounds to answer the questions below.

ammonia
ammonium chloride
calcium oxide
sulfur dioxide
carbon monoxide

magnesium carbonate
zinc chloride
hydrogen chloride
carbon dioxide
sodium sulfate

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

Name a compound which

- (a) produces a gas that turns moist red litmus paper blue when warmed with dilute sodium hydroxide,
..... [1]
- (b) dissolves in water to give a solution of pH less than 7,
..... [1]
- (c) is a covalent compound with 4 atoms in each molecule,
..... [1]
- (d) can be prepared by the titration method,
..... [1]
- (e) is a gas that produces a white precipitate in limewater,
..... [1]
- (f) is used to reduce the acidity of the soil.
..... [1]

[Total: 6 marks]

- 2 Aspirin is a medicine that is used as a painkiller. It is made from salicylic acid. Julian makes a sample of aspirin and he thinks it contains some impurities.

(a) Julian tests the melting point of his sample of aspirin.

Explain how he can use the result of the test to find out whether his sample contains impurities.

.....
 [1]

- (b) Julian also used chromatography to test the purity of his sample of aspirin. He used his own aspirin and pure samples of aspirin and salicylic acid. Fig. 2.1 shows the chromatogram he obtained.

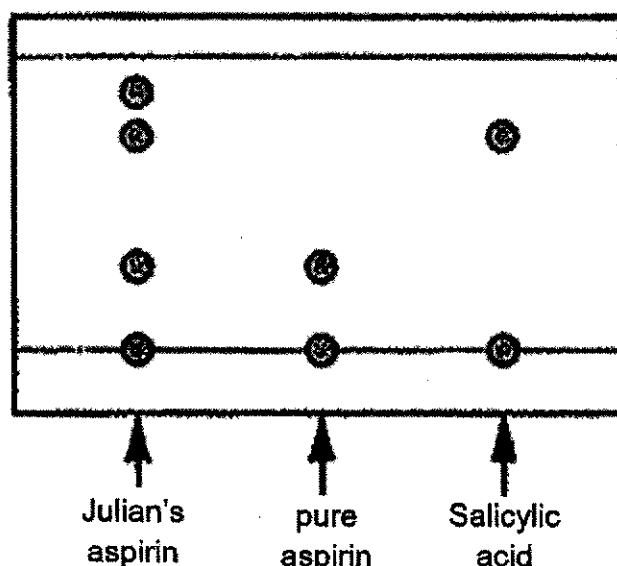


Fig. 2.1

Describe the information provided by the chromatogram about the purity of the Julian's aspirin.

.....
 [2]

- (c) Explain why the starting line must be drawn with a pencil.

.....
 [1]

- 2 (d) State the solvent that can be used in the chromatography.

..... [1]

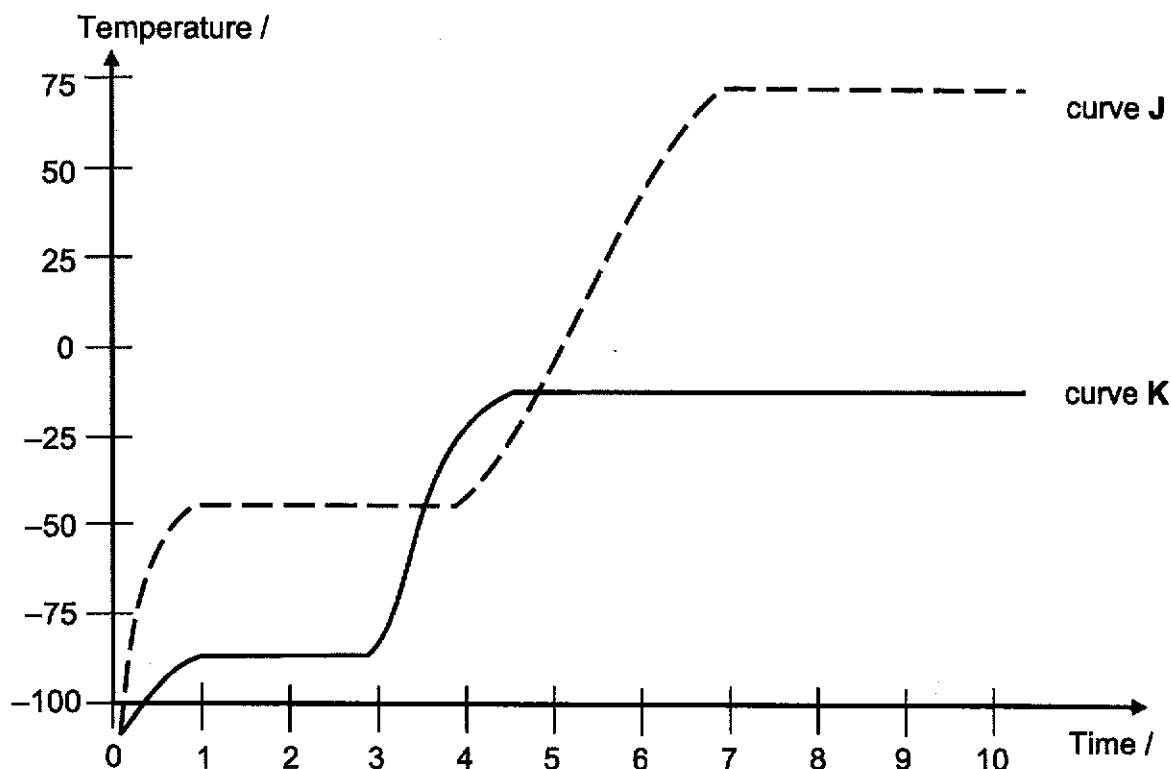
- (e) State one advantage of using paper chromatography.

.....

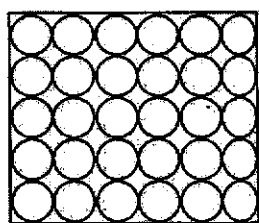
..... [1]

[Total: 6marks]

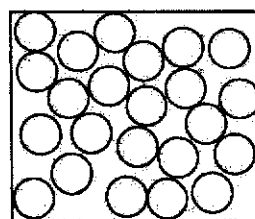
- 3 The graph below shows the heating curve of two substances, nitrogen trichloride and sulfur dioxide. Both substances are heated from solid states at the same temperature of -100°C .



The arrangement of particles in both substances at -50°C is shown below.



nitrogen trichloride



sulfur dioxide

- (a) Identify the respective heating curve for nitrogen trichloride and sulfur dioxide.

nitrogen trichloride :

sulfur dioxide :

[1]

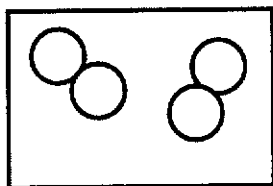
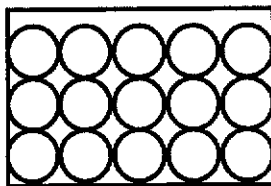
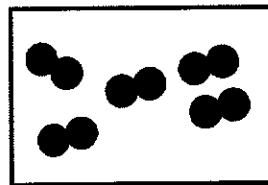
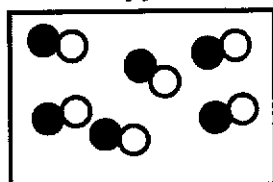
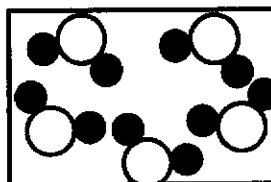
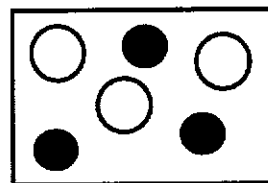
- (b) Complete the following table using the data from the graph above.

nitrogen trichloride		

[1]

[Total: 2 marks]

- 4 Use the options **A** to **F** to answer the following questions. The options may be used once, more than once or not at all.

**A****B****C****D****E****F**

Which of the diagrams above best represents

- | | | | |
|-----|-----------------------------------|-------|-----|
| (a) | water | | [1] |
| (b) | copper metal | | [1] |
| (c) | nitrogen gas | | [1] |
| (d) | a mixture of neon and argon gases | | [1] |

[Total: 4 marks]

- 5 The table below shows some information of four different atoms of the elements **W**, **X**, **Y** and **Z**. The letters do not represent the atomic symbols of the elements.

Element	Atomic Number	Number of Protons	Number of Neutrons	Mass Number	Number of Electrons
W	16			32	
X	1	1	1	2	1
Y			10	20	
Z	19		20		

- (a) Complete the table above by filling in the information of atom **W**, **Y** and **Z**. [3]

- (b) Using the table above, explain why is particle **Z** likely to be a metal.

.....
 [2]

[Total: 5 marks]

- 6 (a) Lithium and oxygen reacts together to form lithium oxide, which has a boiling point of 2900 °C.

(i) Write the chemical formula of lithium oxide.

..... [1]

(ii) Hence, draw the 'dot and cross' diagram of lithium oxide, showing all electrons.

[2]

- (b) Lithium oxide is a basic oxide that can react with carbon dioxide to form lithium carbonate.

Hence, draw the 'dot and cross' diagram of carbon dioxide, showing only the valence electrons.

[2]

- 6 (c) Carbon dioxide has a boiling point of -57°C . Explain, in terms of bonding and structure, the difference between the boiling points of lithium oxide and carbon dioxide.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

- (d) Explain why lithium oxide conducts electricity in aqueous and molten states.

.....

.....

..... [1]

[Total: 10 marks]

- 7 The following are some information about five different substances.

P	A yellow substance, P , has a fixed melting point and a fixed boiling point.
Q	A greenish-yellow gas, Q has a fixed composition and is made up of identical atoms.
R	A colourless gas, R , which has a boiling point of -1°C , burns in oxygen to form carbon dioxide and water only.
S	Upon strong heating, a green solid, S , turns black, and gives off a colourless and odourless gas.
T	There are three spots on a paper chromatogram of T .

Decide whether each substance should be classified as an element, compound or mixture, or either an element or a compound. Show your decision by ticking (✓) the correct box for each substance in the table below.

	Element	Compound	Mixture	Either an element or a compound
P				
Q				
R				
S				
T				

[5]

[Total: 5 marks]

8 Moving across Period 3 of the Periodic Table, the character of the elements changes.

(a) Describe the change and how this affects the nature of its respective oxides.

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

(b) (i) Potassium is an element that is found in Group I, Period 3.
Explain why potassium is found in Group I.

..... [1]

(ii) Describe **two** observations obtained when potassium reacts with cold water.

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

(iii) Write a balanced chemical equation for the reaction.

..... [2]

[Total: 7 marks]

Section B [20 marks]Answer **all** questions in the spaces provided.

- 9 (a) The labels on three bottles of colourless solutions were misplaced. These bottles contain aqueous potassium hydroxide, dilute ethanoic acid and dilute hydrochloric acid.
- (i) A student intends to identify the solutions. He transferred 2 cm³ of each solution into three different test-tubes followed by a few drops of Universal Indicator. State what he will observe in each test-tube.
-
-
-
- [3]
- (ii) Arrange the solutions in increasing order of pH level.
-
- [2]
- (iii) Name and give the formula of the ion that is responsible for the colour of Universal Indicator in aqueous sodium hydroxide observed in a(i).
- [1]
- (iv) The student uses aqueous potassium hydroxide to titrate against dilute hydrochloric acid. Name this reaction.
- [1]
- (v) Write the ionic equation, including state symbols, which represents the reaction in (a)(iv).
- [1]

- 9 (b) Crops and plants thrive in different pH environments and are sensitive to the changes in pH of the soil. The table below shows the suitable pH range for some crops which the farmers intend to grow.

asparagus	6.0 – 8.0
cauliflower	5.5 – 7.5
corns	5.8 – 6.8
potatoes	4.8 – 5.5
tomatoes	6.0 – 6.8

- (i) The farmers measured the pH of the soil to be 5.9. Based on the information given above, which crop(s) is/are best suited to grow in the soil condition?

..... [1]

- (ii) The farmers intend to grow watermelon which thrives well between the pH of 6.2 to 7.0. What can be done to the soil to reduce the acidity of the soil from b(i)?

..... [1]

[Total: 10 marks]

- 10 (a) The list shows the different chemicals commonly found in the Science Laboratory.

Complete the table below by classifying these chemicals according to their solubilities.

<i>Calcium sulfate</i>	<i>Ammonium chloride</i>	<i>Zinc chloride</i>
<i>Lead (II) nitrate</i>	<i>Silver chloride</i>	<i>Barium carbonate</i>

[3]

- (b) Name the method used to prepare insoluble salt.

..... [1]

- (c) Selecting chemicals from the list in (a)(i) only, describe how a sample of insoluble lead (II) chloride can be prepared in the laboratory.

.....

.....

.....

.....

.....

.....

..... [3]

- 10 (d) Phosphorus oxide, calcium oxide and aluminium oxide are formed when the element is reacted with excess oxygen gas.
Tests were carried out on the oxides by adding them to hydrochloric acid and sodium hydroxide separately. Put a tick (✓) where a reaction will take place.

	Phosphorus oxide, calcium oxide, aluminium oxide		
addition of oxide to dilute hydrochloric acid			
addition of oxide to dilute sodium hydroxide			

[3]

[Total: 10 marks]

End of Paper

The Periodic Table of Elements

Group																							
I	II											III	IV	V	VI	VII	0						
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						
Key proton (atomic) number atomic symbol name relative atomic mass																							
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	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 -	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 -

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



REGENT SECONDARY SCHOOL
END OF YEAR EXAMINATIONS / 2019
SECONDARY 3 EXPRESS
SCIENCE(CHEMISTRY)
(5076/5078)

Paper 1 [20 marks]

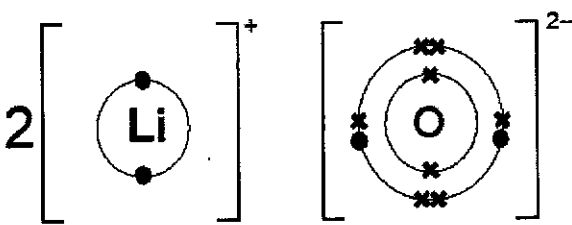
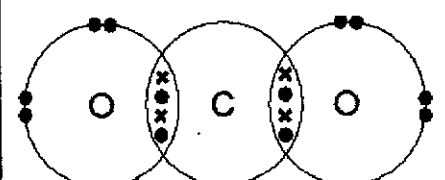
A	B	C	C	B
D	A	C	A	A
C	B	D	B	A
A	A	C	C	C

PAPER 3 Section A: [45 marks]

1	(a)	Ammonium chloride	1
	(b)	Sulfur dioxide/ carbon dioxide/ hydrogen chloride	1
	(c)	Ammonia	1
	(d)	Sodium sulfate/ ammonium chloride	1
	(e)	Carbon dioxide	1
	(f)	Calcium oxide	1
		State 1 not more than 1. 1/2m deduction for extra compound incorrect. Most of the students are able to do last 2 questions. Some able to do a and b. However a few confused between ammonia and ammonium chloride. Question asked for reacts with sodium hydroxide.	
Total : 6 marks			
2	(a)	If the sample melts over a range of temperature, the sample contains impurities / does not have a fixed melting point	1
		Aspirin boiling point is different from normal aspirin [Pure aspirin then can be accepted as normal aspirin is not clear? [impure substances boil over a range rather than different]	
	(b)	Julian's aspirin is not pure Sample contains more than 1 spot/ A pure compound has only 1 spot but Julian's aspirin consists of three spots	1 ½ ½
		[Mark is given because student is reading from the chromatogram] One extra dot – technically it is not true cos pure aspirin only has 1 dot not 2 [rej]	
	(c)	Pen has ink which is a mixture of dyes. Hence it will interfere with the chromatogram/test.	½ ½
		Unable to give full answer by students	
	(d)	Water / alcohol / acetone/ ethanol	1
		Most able to answer correctly	
	(e)	Only a small sample is required OR It is a <u>very sensitive</u> and good test for purity and identification of substances OR It gives quick results [from notes]/ fast	1
		Most able to give quick results.	
Total : 7 marks			

3	(a)	Curve J Curve K	$\frac{1}{2}$ $\frac{1}{2}$
		Most able to give correct answer	
	(b)	-40 to -48 (rej -50); 70 to 74 (rej 75 as it is obviously not in line) Every correct answer – $\frac{1}{2}$ m Ecf from part A	1
Total : 3 marks			
4	(a)	E	X
	(b)	B	
	(c)	C/A	
	(d)	F	x
		Most students are able to answer this question. A and D due to printing of diagrams. 2marks will be added for all students	
Total : 2 marks			

5	(a)	16 ; 16 ; 2,8,6 10 ; 10 ; 2,8 19 ; 39 ; 2,8,8,1 Every correct row – 1 m	3
	(b)	Z needs to lose 1 valence electron to become a positive ion	1 1
		Many students wrote one valence electrons, group I therefore metals [Not accepted]	
Total : 5 marks			

6	(a)(i)	Li ₂ O	1
	(a)(ii)	 Correct arrangement of electrons in Li [0.5] Correct arrangement of electrons in O [0.5] Correct charge on Li and on O [0.5] Correct ratio of 2 : 1 [0.5]	2
	(b)	 1m – correct arrangement of unshared electrons 1m – correct arrangement of shared electrons	2

		Some students are able to draw knowing that it is double bond	
	(c)	Lithium oxide is an ionic compound held by strong electrostatic forces of attraction between ions . A large amount of heat energy is required to overcome these forces, resulting in a high melting and boiling point .	0.5 0.5 0.5 0.5
		Carbon dioxide is a covalent compound held by weak van der waals' forces of attraction between molecules . A small amount of heat energy is required to overcome these forces, resulting in a low melting and boiling point .	0.5 0.5 0.5 0.5
		Question is not well answered. Standard answers to memorise.	
	(d)	In the aqueous or molten state, the ions are no longer held in their fixed positions as the lattice structure is broken down. Hence there are mobile ions to carry the electric current.	0.5 0.5
		Not well answered. Standard answers to memorise.	
Total : 10 marks			

7		P : can be element or compound Q : element R : compound S : compound T : mixture	5
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Total : 5 marks

8	(a)	The elements changes from metallic to non-metallic. [decreasing metallic properties?] Hence the nature of the respective oxides changes from basic to amphoteric to acidic	1 1
	(b)(i)	It has 1 valence electron/ 1 electron in its valence shell	1
	(b)(ii)	Potassium reacts violently with cold water OR Potassium burns with a lilac flame OR Potassium floats on the surface of water	1 1
		Any 2 of the above	
		Not well answered	
	(b)(iii)	$2K + 2H_2O \rightarrow 2KOH + H_2$ Correct formula – 1m Correct balancing – 1m	2
		Equation proves to be difficult for class 35 n 36	

Total : 7marks

9	(a)(i)	Universal Indicator will show Violet in potassium hydroxide Orange / yellow in ethanoic acid Red in dilute hydrochloric acid	1 1 1
	(a)(ii)	Dilute hydrochloric acid, ethanoic acid, potassium hydroxide	2
	(a)(iii)	Hydroxide ions OH^-	$\frac{1}{2}$ $\frac{1}{2}$
	(a)(iv)	Neutralisation	1

	(a)(v)	$H^+ (aq) + OH^- (aq) \rightarrow H_2O (l)$	1
		Correct formula – 1 m	
		Not able to do this question for 35 n 36	
	(b)(i)	Cauliflower & corns	$\frac{1}{2}$ $\frac{1}{2}$
	(b)(ii)	Calcium hydroxide / calcium oxide/ calcium carbonate	1
Total : 10 marks			

10	(a)	<table border="1"> <tr> <td>Zinc chloride</td> <td>calcium sulfate</td> </tr> <tr> <td>Lead (II) nitrate</td> <td>Barium carbonate</td> </tr> <tr> <td>ammonium chloride</td> <td>silver chloride</td> </tr> </table>	Zinc chloride	calcium sulfate	Lead (II) nitrate	Barium carbonate	ammonium chloride	silver chloride	3					
	Zinc chloride	calcium sulfate												
	Lead (II) nitrate	Barium carbonate												
	ammonium chloride	silver chloride												
		1 mark for two correct answers												
(b)	precipitation	1												
(c)	Add a fixed volume of lead (II) nitrate solution and zinc chloride/ ammonium chloride solution in a beaker. Upon stirring, a white precipitate of lead (II) chloride and a colourless solution of zinc nitrate solution is formed. Filter the mixture. Lead (II) chloride is the residue and zinc nitrate solution is the filtrate Wash the residue with cold distilled water to remove any water-soluble impurities. Dry between pieces of filter paper to obtain pure dry lead (II) chloride.	1 1 $\frac{1}{2}$ $\frac{1}{2}$												
(d)	<table border="1"> <tr> <td></td> <td>phosphorus oxide</td> <td>Calcium oxide</td> <td>aluminium oxide</td> </tr> <tr> <td>addition of oxide to dilute hydrochloric acid</td> <td></td> <td>✓</td> <td>✓</td> </tr> <tr> <td>addition of oxide to dilute sodium hydroxide</td> <td>✓</td> <td></td> <td>✓</td> </tr> </table> 1m for correct ticks for each reaction		phosphorus oxide	Calcium oxide	aluminium oxide	addition of oxide to dilute hydrochloric acid		✓	✓	addition of oxide to dilute sodium hydroxide	✓		✓	3
	phosphorus oxide	Calcium oxide	aluminium oxide											
addition of oxide to dilute hydrochloric acid		✓	✓											
addition of oxide to dilute sodium hydroxide	✓		✓											

Total : 10 marks			
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