SINGAPORE SPORTS SCHOOL
PRELIMINARY EXAMINATION
SECONDARY 4
NORMAL ACADEMIC

CANDIDATE NAME			
CLASS		INDEX NUMBER	

SCIENCE (CHEMISTRY) 5105/03, 5107/03

Paper 3 Multiple Choice **16 AUGUST 2021**

Papers 3 and 4: 1 h 15 min

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 class, index number and name on the Answer Sheet in the spaces provided.

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.

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 **10**.
The use of an approved scientific calculator is expected, where appropriate.

Mark:	**20**

This document consists of **9** printed pages and **1** blank page.

1 1.50g of zinc powder is added to 50.0cm^3 of hydrochloric acid.

Which apparatus is used to measure the zinc and hydrochloric acid?

	zinc	hydrochloric acid
A	electronic balance	beaker
B	electronic balance	burette
C	weighing scale	beaker
D	weighing scale	burette

2 The melting points and boiling points of pure substances **W**, **X** and **Y** are given in the table below.

	substance		
	W	**X**	**Y**
melting point / °C	–114	44	–101
boiling point / °C	78	280	–34

The substances are chlorine, ethanol and phosphorus.

Which row identifies **W**, **X** and **Y**?

	W	**X**	**Y**
A	chlorine	phosphorus	ethanol
B	ethanol	chlorine	phosphorus
C	ethanol	phosphorus	chlorine
D	phosphorus	chlorine	ethanol

3 Which method can be used to separate a mixture of water and ethanol?

A chromatography

B evaporation

C filtration

D fractional distillation

4 Which statement about an atom of oxygen-18, $^{18}_{8}O$, is correct?

A It has more neutrons than protons.
B It has more protons than electrons.
C It has the same number of neutrons and electrons.
D It has a total of 28 protons, neutrons and electrons.

5 A powdered solid **G** is grey with white specks. Water is added to it and this is stirred and filtered. Colourless liquid **H** and grey solid **J** are collected. **J** is attracted to a magnet.

Which of the following describes **G**, **H** and **J** correctly?

	G	**H**	**J**
A	compound	element	mixture
B	element	mixture	element
C	mixture	compound	compound
D	mixture	mixture	element

6 The proton number of element **M** is 11. It is heated with oxygen.
Which statement correctly describes the compound formed from this reaction of **M** and oxygen?

A The compound is formed by sharing a pair of electrons between the atoms.
B The compound formed is a solid at room temperature.
C The compound formed conducts electricity in all states.
D The compound formed melts easily when heated.

7 The compound magnesium nitrate has the formula $Mg(NO_3)_2$.
What is the relative formula mass, M_r, of magnesium nitrate?

A 80
B 134
C 148
D 172

8 Four solutions are separately tested with blue litmus paper and Universal Indicator. The results are shown below.

solution	result when tested with indicator	
	blue litmus	**Universal indicator**
1	blue	blue
2	red	red
3	red	orange
4	blue	green

Which statement is correct?

A Solutions 1 and 4 are acidic
B Solutions 1 and 4 are alkaline.
C Solutions 2 and 3 are acidic.
D Solutions 2 and 3 are alkaline.

9 Which equation correctly shows the formation of a gas as a result of the reaction?

A $CuCO_3(s) + 2HCl(aq) \rightarrow CuCl_2(aq) + H_2O(l) + CO_2(g)$
B $Cu(s) + H_2SO_4(aq) \rightarrow CuSO_4(aq) + H_2(g)$
C $Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$
D $NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$

10 Which statement about elements in Group VII of the Periodic Table is correct?

A Their atoms have full valence shells.

B They are all diatomic molecules.

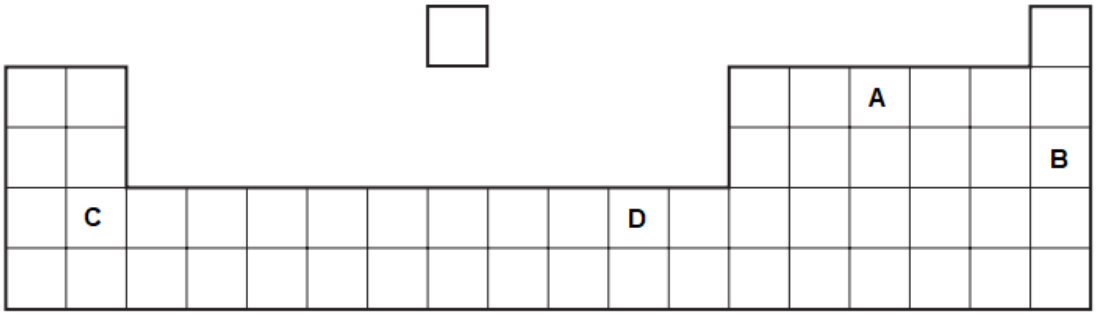
C They are all solids at room temperature.

D They are all colourless gases.

11 An element ***E*** has an electronic structure of 2.8.5.

The positions of four elements are shown in the Periodic Table below.

Which element is found in the same period as ***E***?



12 Strontium and magnesium belong to the same group in the Periodic Table.

Which of the following shows the correct formula of strontium chloride?

A $SrCl_2$

B Sr_2Cl

C $StCl_2$

D St_2Cl

13 A student added dilute hydrochloric acid to four metals and recorded the results in the table below.

test	results	
	metal	**gas given off**
1	copper	yes
2	iron	yes
3	magnesium	no
4	zinc	yes

There were some errors in his results.
Which two results are correct?

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

14 Which methods prevent iron from rusting?

	painting	**coating with grease**	**coating with salt**
A	×	✓	✓
B	✓	×	✓
C	✓	✓	×
D	×	×	✓

✓ = prevents rusting
× = does not prevent rusting

15 Which property is common for all metals?

A They have high density.
B They have high melting points.
C They are difficult to cut.
D They are good heat conductors.

16 Which of the following is true about a colourless, neutral gas produced from incomplete combustion of fuels?

A It causes eye irritation in humans and animals.

B It decreases pH of lakes and rivers.

C It destroys leaves and roots of plants.

D It prevents red blood cells from transporting oxygen.

17 The following gases pollute the atmosphere.

1 oxides of nitrogen

2 sulfur dioxide

3 methane

Which gases contribute to acid rain?

A **1** and **2**

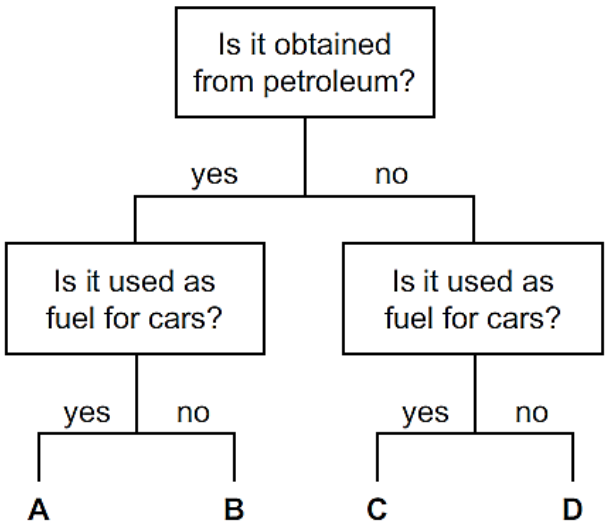
B **1** and **3**

C **2** and **3**

D **1**, **2** and **3**

18 Study the following flowchart on fuels.

Which fuel is kerosene?



19 Which of the following compound is an alkene?

A cyclohexene
B chloromethane
C ethanol
D methane

20 A reaction of butane is shown below.

$$\text{butane} \xrightarrow[\text{and heat}]{\text{catalyst}} \text{butene} + \text{hydrogen}$$

What type of reaction is this?

A addition
B combustion
C cracking
D substitution

------- **End of Paper** ------

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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		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.).