



## LOYANG VIEW SECONDARY SCHOOL

Preliminary Examination 2023

Secondary Four Normal (Academic)

CANDIDATE NAME : .....

CLASS : ..... INDEX NUMBER : .....

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### SCIENCE (CHEMISTRY)

5105/03

Paper 3 Multiple Choice

3 Aug 2023

Papers 3 and 4: 1 hour 15 minutes

Additional Materials: Multiple Choice Answer Sheet

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#### READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, 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 **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.**

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.

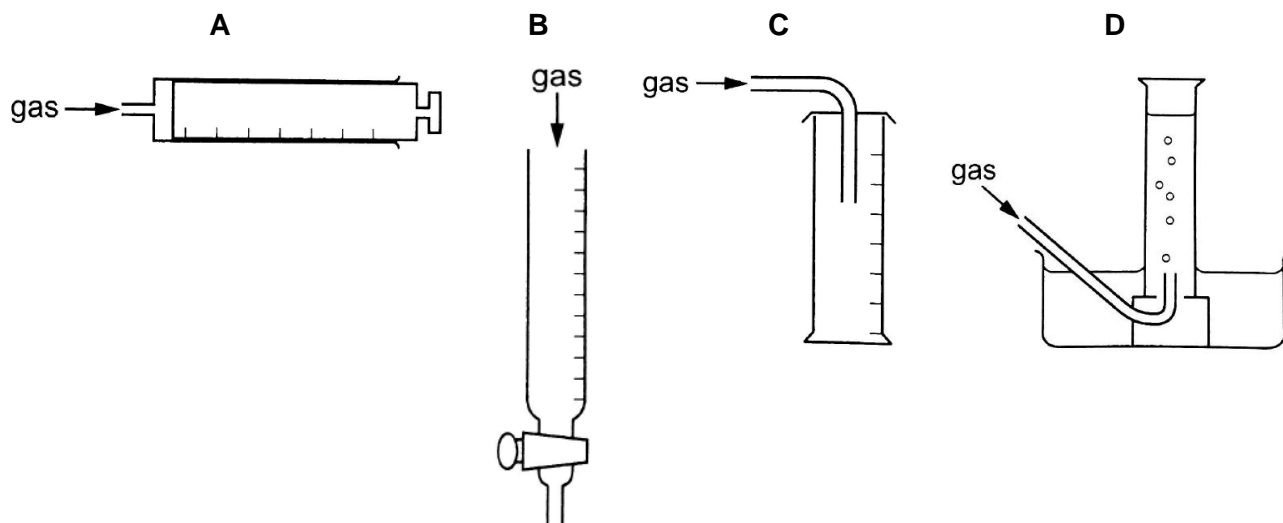
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Setter: Mdm Elvina Abu Hasan

This paper consists of **10** printed pages.

- 1 Students do an experiment that produces a soluble gas.

Which apparatus allows them to measure the volume of the gas **most** accurately?



- 2 The table shows the boiling points of some of the elements present in air.

element	boiling point / °C
argon	−186
helium	−269
neon	−246
nitrogen	−196
oxygen	−183

Which elements are liquid at −200 °C?

- A** argon, helium and neon
- B** argon, nitrogen and oxygen
- C** helium and neon only
- D** nitrogen and oxygen only

- 3 Which changes occur when a liquid at 80 °C becomes a gas at 140 °C?

	distance between particles	energy of particles
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decrease
<b>D</b>	increases	increases

- 4 A chromatography test was carried out on the contents of a fizzy drink to find out which colourings it contains. The results of the chromatogram is shown below.



Which two colourings are found in the fizzy drink?

- A** 1 and 3      **B** 2 and 4      **C** 2 and 5      **D** 3 and 4
- 5 The structures of four atoms are given in the table below.

atom	number of protons	number of electrons	number of neutrons
W	15	15	15
X	16	16	16
Y	15	15	17
Z	16	18	16

Which pair of atoms are isotopes?

- A** W and X  
**B** W and Y  
**C** X and Y  
**D** X and Z

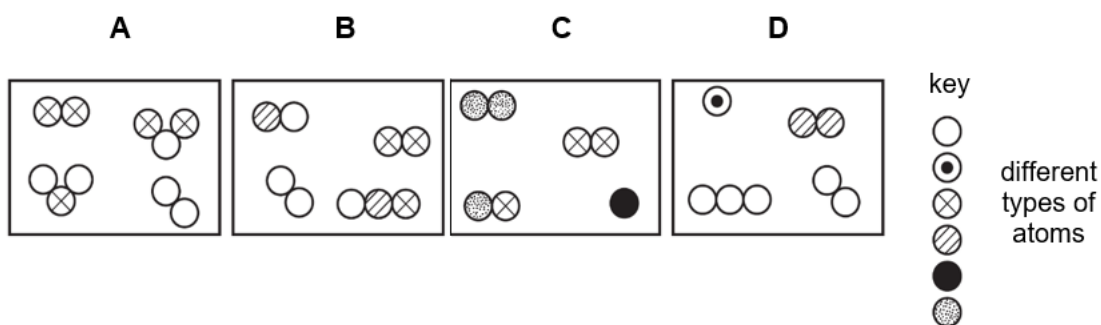
- 6 Magnesium metal reacts with chlorine gas to form magnesium chloride.

Which substance could be magnesium chloride?

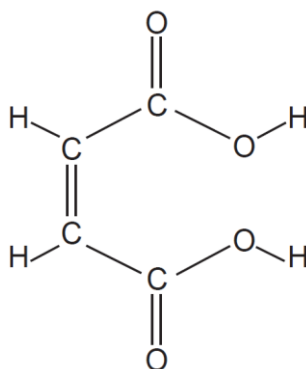
	melting point	solubility in water	conducts electricity	
			solid	liquid
<b>A</b>	high	insoluble	no	yes
<b>B</b>	high	soluble	no	yes
<b>C</b>	low	insoluble	no	no
<b>D</b>	low	soluble	yes	yes

- 7 Four different mixtures of gases are made.

Which diagram represents a mixture consisting of elements only?



- 8 Butenedioic acid has the structure shown below.



What is the molecular formula of butenedioic acid?

- A**  $\text{C}_2\text{H}_2\text{O}_2$   
**B**  $\text{C}_4\text{H}_4\text{O}_2$   
**C**  $\text{C}_4\text{H}_4\text{O}_4$   
**D**  $\text{C}_6\text{H}_4\text{O}_4$

- 9 Four different solutions, W, X, Y and Z, are tested with Universal Indicator.

solution	W	X	Y	Z
colour with Universal Indicator	green	red	purple	orange

Which solution(s) is / are acidic?

- A** W and Z  
**B** X only  
**C** X and Z  
**D** Y only
- 10 Element Y forms an oxide that reacts with both acids and bases.

Which row is correct for element Y?

	type of element	type of oxide
<b>A</b>	metallic	amphoteric
<b>B</b>	metallic	basic
<b>C</b>	non-metallic	acidic
<b>D</b>	non-metallic	amphoteric

- 11 Elements X, Y and Z are in Group VII of the Periodic Table.

X is a gas.

Y is less reactive than Z.

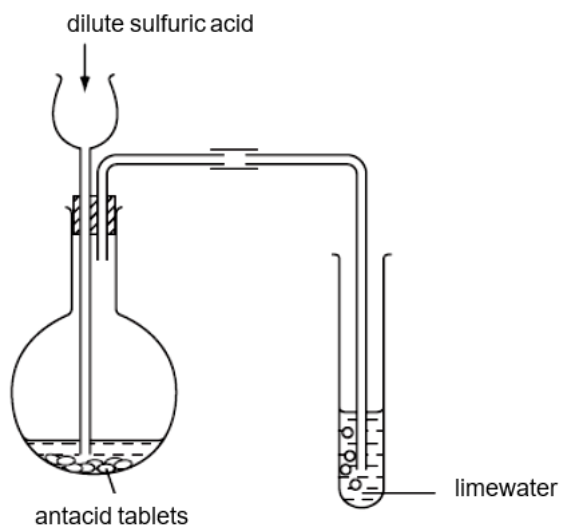
Z is a red liquid.

When X, Y and Z are placed in order of increasing proton number, which is the correct order?

- A**  $X \rightarrow Y \rightarrow Z$   
**B**  $X \rightarrow Z \rightarrow Y$   
**C**  $Y \rightarrow X \rightarrow Z$   
**D**  $Y \rightarrow Z \rightarrow X$

- 12** Antacid tablets are taken to relieve indigestion.

In an experiment, dilute sulfuric acid is added to antacid tablets in the apparatus shown. The gas given off is bubbled through limewater. A white precipitate forms in the limewater.



What do the antacid tablets contain?

- A** magnesium  
**B** magnesium carbonate  
**C** magnesium hydroxide  
**D** magnesium oxide
- 13** The results of adding some metals to salt solutions are as follows:  
 copper + zinc sulfate  $\rightarrow$  no reaction  
 magnesium + zinc sulfate  $\rightarrow$  magnesium sulfate + zinc  
 copper + silver sulfate  $\rightarrow$  copper(II) sulfate + silver

What is the order of reactivity of the metals?

	most reactive $\longrightarrow$ least reactive		
<b>A</b>	magnesium	copper	zinc
<b>B</b>	magnesium	zinc	copper
<b>C</b>	silver	copper	zinc
<b>D</b>	zinc	magnesium	silver

- 14** The table below describe the reactions between three metals X, Y and Z with cold water and steam.

	reaction with cold water	reaction with steam
X	no reaction	reacts slowly to form hydrogen gas
Y	no reaction	no reaction
Z	reacts readily to form hydrogen gas	reacts violently to form hydrogen gas

What could be the identities of metals X, Y and Z?

	X	Y	Z
<b>A</b>	copper	lead	magnesium
<b>B</b>	iron	lead	calcium
<b>C</b>	zinc	sodium	copper
<b>D</b>	zinc	potassium	silver

- 15** Which row describes the trends in melting point and reactivity down Group I?

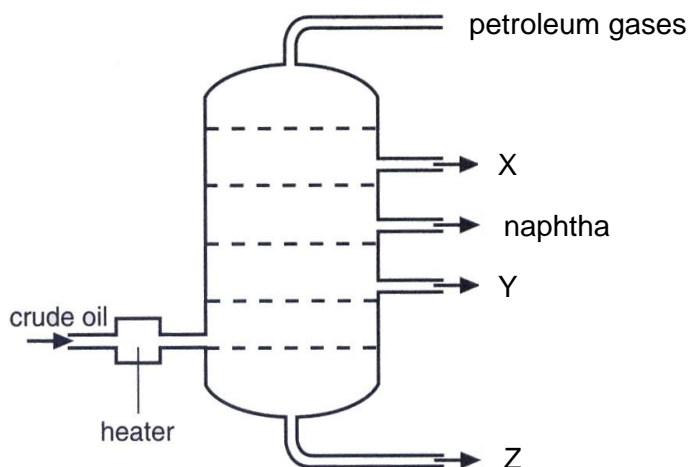
	trend in melting point	trend in reactivity
<b>A</b>	decreases down the group	increases down the group
<b>B</b>	decreases down the group	decreases down the group
<b>C</b>	increases down the group	increases down the group
<b>D</b>	increases down the group	decreases down the group

- 16** Lubricating oil is obtained from crude oil.

What is lubricating oil used for?

- A** as fuel for aircraft engines
- B** as fuel for heating and cooking
- C** for making polishes and waxes
- D** for making road surfaces

- 17 The diagram below shows a section of an oil refinery which separates crude oil into useful fractions.



What are the fractions X, Y and Z?

	X	Y	Z
<b>A</b>	petrol	lubricating oil	kerosene
<b>B</b>	petrol	kerosene	bitumen
<b>C</b>	diesel	kerosene	lubricating oil
<b>D</b>	lubricating oil	petrol	bitumen

- 18 Margarine is manufactured by passing hydrogen through unsaturated vegetable oils to form a solid product.

Which type of reaction is involved in this process?

- A** addition  
**B** displacement  
**C** neutralisation  
**D** substitution
- 19 Cracking is a process where big alkane molecules are passed over a solid catalyst at a high temperature to produce a mixture of alkanes.

Dodacane,  $C_{12}H_{26}$ , can be cracked to produce two products as shown in the equation below.

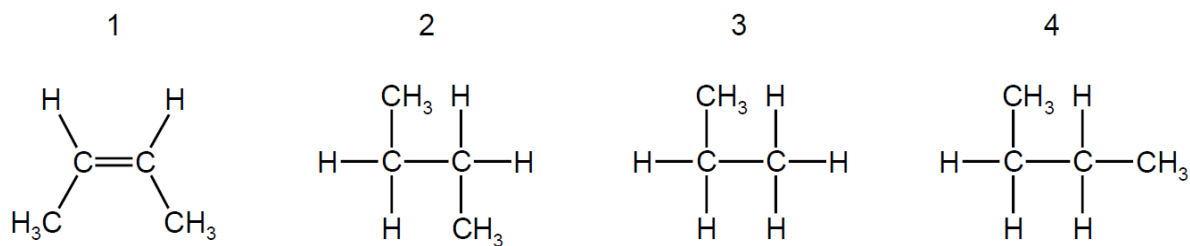


What is the chemical formula for hydrocarbon Z?

- A**  $C_2H_2$       **B**  $C_2H_4$       **C**  $C_2H_6$       **D**  $C_7H_{16}$



**20** The structures of some organic molecules are shown.



Which structures represent an alkane with four carbon atoms?

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

**END OF PAPER**

# The Periodic Table of Elements

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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	117 Ts tennessine	118 Og oganesson	119 Uu ununoctium	120 Uub unbihrium	121 Uut untrium	122 Uub unbinilium	123 Uut unbinilium	124 Uub unbinilium	125 Uut unbinilium	126 Uub unbinilium	127 Uut unbinilium	128 Uub unbinilium	129 Uut unbinilium	130 Uub unbinilium	131 Uut unbinilium	132 Uub unbinilium	133 Uut unbinilium	134 Uub unbinilium	135 Uut unbinilium	136 Uub unbinilium	137 Uut unbinilium	138 Uub unbinilium	139 Uut unbinilium	140 Uub unbinilium	141 Uut unbinilium	142 Uub unbinilium	143 Uut unbinilium	144 Uub unbinilium	145 Uut unbinilium	146 Uub unbinilium	147 Uut unbinilium	148 Uub unbinilium	149 Uut unbinilium	150 Uub unbinilium	151 Uut unbinilium	152 Uub 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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  $24 \text{ dm}^3$  at room temperature and pressure (r.t.p.).