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**ANG MO KIO SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2025
SECONDARY THREE EXPRESS**

SCIENCE (PHYSICS, CHEMISTRY)
Paper 1 Multiple Choice

5086/01
8 October 2025
1 hour

Setter: Mrs Joselyn Luei

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 at the top of this paper and on the Answer Sheet in the spaces provided.

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 Data Sheet is printed on page **10**.

A copy of the Periodic Table is printed on page **11**.

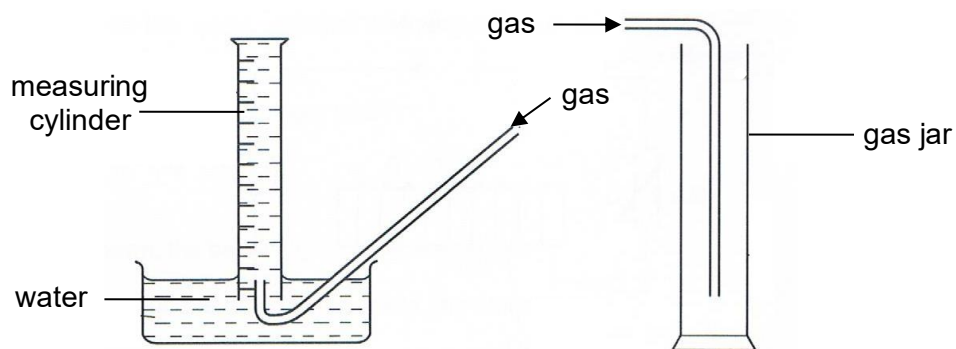
The use of an approved scientific calculator is expected, where appropriate.

At the end of the examination, hand in your Answer Sheet and Paper 1 Question Paper separately.

This document consists of **11** printed pages and **1** blank page.

[Turn over

21 The diagram below shows two methods of collecting gases.



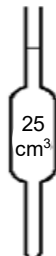
Which row gives the properties of a gas which can be collected by both methods?

	property 1	property 2
A	insoluble in water	denser than air
B	insoluble in water	less dense than air
C	soluble in water	denser than air
D	soluble in water	less dense than air

22 The following apparatus are found in a Chemistry laboratory.



W



X



Y

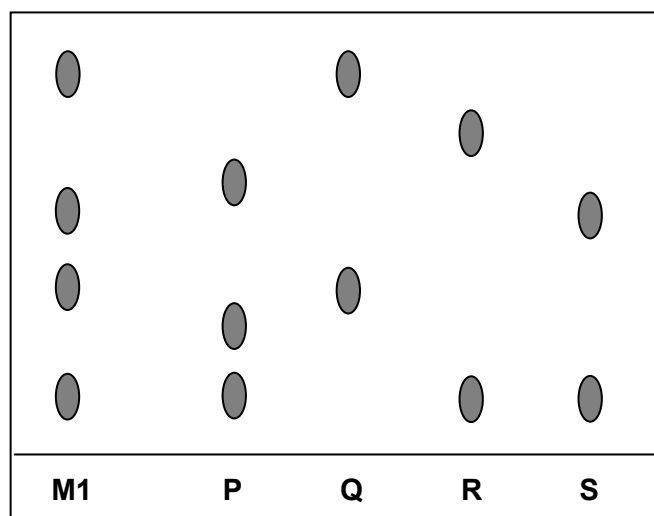


Z

Which one of the following best matches the apparatus to the purpose of measuring a given volume of liquid?

	a fixed volume of 25.0 cm ³ accurately	28.3 cm ³ accurately	25 cm ³
A	W	X	Y
B	X	Y	Z
C	X	Z	Y
D	Y	Z	X

- 23** A lab analyst carried out paper chromatography to investigate the presence of banned performance-enhancing drug substances **P**, **Q**, **R** and **S** in the urine sample of athlete **M1**. The paper chromatogram of the results are shown below.



Which of the following drugs **P**, **Q**, **R** and **S** did the athlete **M1** consume?

- A** **P** and **Q**
 - B** **Q** and **R**
 - C** **Q** and **S**
 - D** **R** and **S**
- 24** In which change of state is heat energy given out and there is a big change in volume?
- A** boiling
 - B** condensation
 - C** freezing
 - D** melting
- 25** When a test tube containing liquid **L** is placed in a beaker of boiling water, liquid **L** immediately starts to boil.
- What is the boiling point of liquid **L**?
- A** Between 0°C and room temperature.
 - B** Below room temperature.
 - C** Between room temperature and 100°C.
 - D** Greater than 100°C.

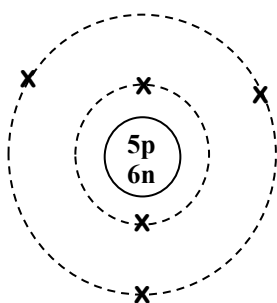
- 26 An element **Z** forms a positive ion with the electronic configuration 2, 8, 8.

What is the proton number of element **Z**?

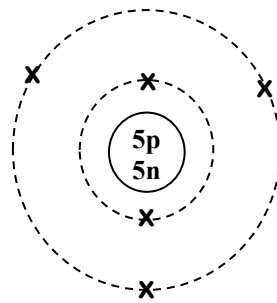
- A 16
- B 17
- C 18
- D 20

- 27 Which of the following shows an isotope of the element ${}^{11}_5\text{B}$?

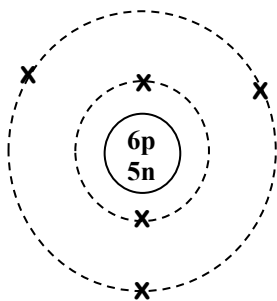
A



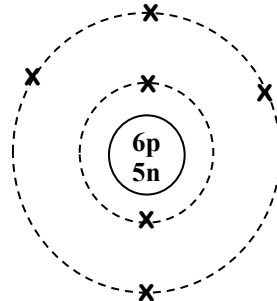
B



C



D



28 Which of the following statements about a covalent bond are correct?

- I. It can be formed between metal and non-metal atoms.
- II. It can be formed between non-metal atoms.
- III. It involves the sharing of electrons.
- IV. It involves the transfer of electrons.

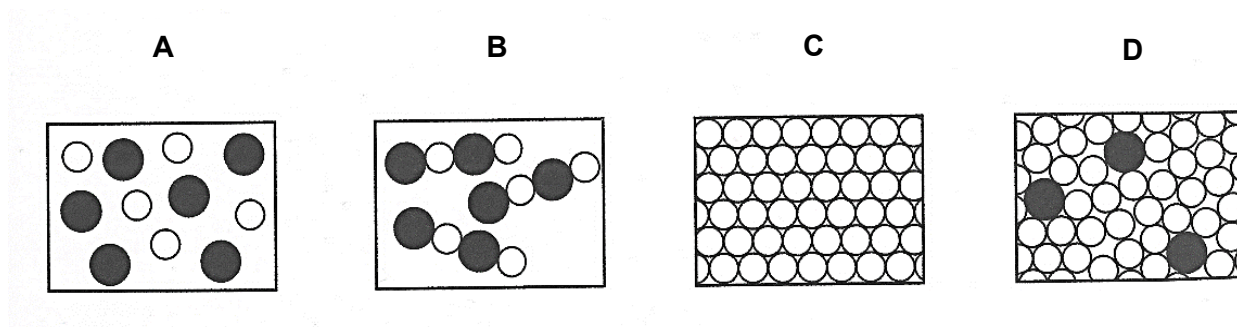
- A** I and III
- B** I and IV
- C** II and III
- D** II and IV

29 **A** is an element belonging to Group 1 and **B** is an element belonging to Group 16.

What is the formula of the compound formed by **A** and **B**?

- A** A_2B
- B** AB_2
- C** A_2B_3
- D** AB_3

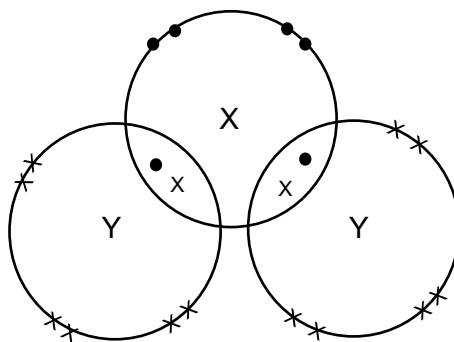
30 The diagrams represent different arrangements of atoms. Which diagram represents an alloy?



31 How does a calcium atom form a bond with an oxygen atom?

- A** By sharing two pairs of electrons, both of which come from the oxygen atom.
- B** By sharing two pairs of electrons, both of which come from the calcium atom.
- C** By transferring two electrons from the oxygen atom to the calcium atom.
- D** By transferring two electrons from the calcium atom to the oxygen atom.

32 The diagram shows how atoms that make up the compound XY_2 share their valence electrons. Which statement is correct?

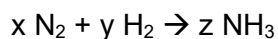


- A** X is likely to be calcium.
- B** X is likely to be carbon.
- C** X is likely to be hydrogen.
- D** X is likely to be sulfur.

33 Metal X forms a compound X_2SO_4 . The chloride of metal X would have the chemical formula

- A** $XC\text{I}$
- B** $XC\text{I}_2$
- C** $X_2C\text{I}$
- D** $X_2C\text{I}_3$

34 A chemical equation is shown below.



Which numbers will correctly balance this chemical equation?

	x	y	z
A	1	2	2
B	1	3	2
C	2	1	2
D	2	1	4

35 The tables show the pH ranges of two indicators, methyl orange and methyl red.

methyl orange	red		yellow				
pH	2	3	4	5	6	7	8

methyl red	red				yellow		
pH	2	3	4	5	6	7	8

The table below shows the pH of four solutions.

solution	W	X	Y	Z
pH	2.0	3.0	4.0	6.0

Which solution will have both indicators show yellow?

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

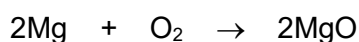
36 Which ionic equation represents the reaction between dilute sulfuric acid and aqueous sodium hydroxide?

- A $\text{H}_2^+ (\text{aq}) + \text{O}^{2-} (\text{aq}) \rightarrow \text{H}_2\text{O} (\text{l})$
- B $\text{H}^+ (\text{aq}) + \text{OH}^- (\text{aq}) \rightarrow \text{H}_2\text{O} (\text{l})$
- C $2\text{Na}^+ (\text{aq}) + \text{SO}_4^{2-} (\text{aq}) \rightarrow \text{Na}_2\text{SO}_4 (\text{aq})$
- D $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{NaOH} (\text{aq}) \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} (\text{l})$

37 Which statement best describes the difference between ethanoic acid and dilute hydrochloric acid?

- A** hydrogen gas is given out when magnesium metal reacts with dilute hydrochloric acid but not with ethanoic acid
- B** carbon dioxide gas is given out when sodium carbonate reacts with dilute hydrochloric acid but not with ethanoic acid
- C** moist blue litmus paper turns red in dilute hydrochloric acid but remains blue in ethanoic acid
- D** Universal indicator turns red in dilute hydrochloric acid but orange in ethanoic acid

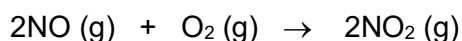
38 Magnesium reacts with excess oxygen according to the following equation:



What volume of oxygen is needed to combine with 1.2 g of magnesium?

- A** 14.4 dm³
- B** 1.2 dm³
- C** 0.6 dm³
- D** 0.3 dm³

39 10 cm³ of nitrogen monoxide are reacted with 10 cm³ of oxygen. The equation for the reaction is



What is the volume of gas present at the end of the reaction?

(All volumes are measured at room temperature and pressure.)

- A** 10 cm³
- B** 15 cm³
- C** 20 cm³
- D** 30 cm³

40 Which one of the following has the same mass as one mole of liquid H_2O ?

- A** 24 dm^3 of water
- B** one molecule of water
- C** one mole of steam
- D** two moles of H_2 plus one mole of O_2

END OF PAPER

Group																								
1	2											13	14	15	16	17	18							
Key proton (atomic) number atomic symbol name relative atomic mass							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	3	4	5	6	7	8	9	10	11	12	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 —	113 Nh nihonium —	114 F/ flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —							

lanthanoids

actinoids

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 162	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 –

The Periodic Table of Elements

Group																	
1	2											13	14	15	16	17	18
							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																
19 K potassium 39	20 Ca calcium 40	3	4	5	6	7	8	9	10	11	12	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
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
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actinoids	89 Ac actinium	90 Th thorium	91 Pa protactinium	92 U uranium	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

–	232	231	238	–	–	–	–	–	–	–	–	–	–	–
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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
The Avogadro constant, $L = 6.02 \times 10^{23} \text{ mol}^{-1}$.

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