



ANDERSON SERANGOON JUNIOR COLLEGE
2025 JC 2 PRELIMINARY EXAMINATION

NAME: _____ ()

CLASS: 25 / ____

CHEMISTRY

Paper 1 Multiple Choice

8873/01

2 September 2025

1 hour

Additional Materials: Multiple choice Answer Sheet
 Data Booklet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name and class on the Answer Sheet in the spaces provided.

There are **thirty** 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.

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

Multiple Choice Answer Sheet

Write your name, class and NRIC / FIN number, **including** the reference letter.

Shade the NRIC / FIN number.

Exam Title: JC2 Preliminary Exam

Exam Details: H1 Chemistry / Paper 1

Date: 02/09/2025

This document consists of 14 printed pages and 2 blank pages.

1 Use of the Data Booklet is relevant to this question.

L is the Avogadro constant. Which statement is correct?

- A** 71.0 g of chlorine gas contains $2L$ molecules.
- B** 1.00 mol of sodium sulfate contains $3L$ ions.
- C** 6.9 g of lithium ion, Li^+ , contains $3L$ electrons.
- D** 48 dm^3 of hydrogen gas, measured at r.t.p, contains $2L$ atoms.

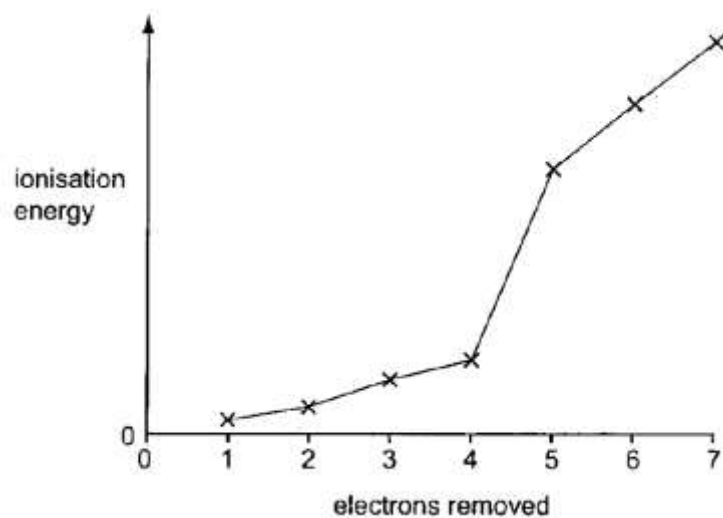
2 Use of the Data Booklet is relevant to this question.

Iodine-131 is radioactive and is used in thyroid cancer treatment. Which statements about this element are correct?

1	There are p electrons present in 5 quantum shells.
2	There are 78 neutrons, 53 protons and 54 electrons in the negative ion of $^{131}_{53}\text{I}$.
3	All electrons in the negative ion of $^{131}_{53}\text{I}$ are paired.

- A** 1, 2 and 3 **B** 2 and 3 only **C** 1 and 3 only **D** 2 only

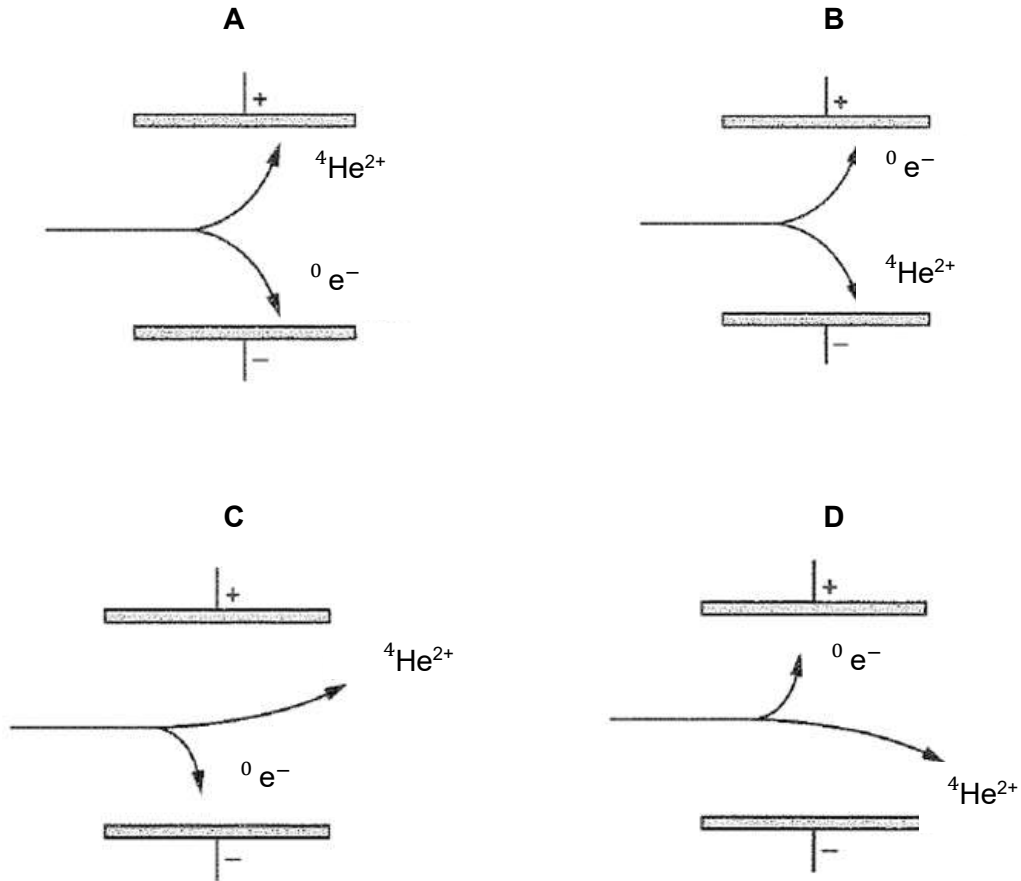
- 3 The first seven ionisation energies of an element **Y** are shown in the sketch graph.



What could be the identity of element **Y**?

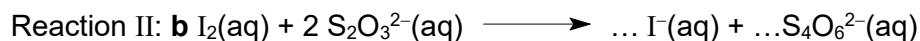
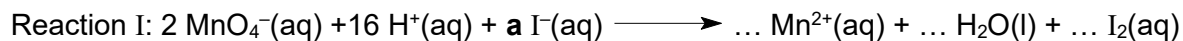
- | | |
|---------------------|------------------|
| A Bromine | B Carbon |
| C Phosphorus | D Silicon |

- 4 A beam of particles contains ${}^4\text{He}^{2+}$ and ${}^0\text{e}^{-}$ ions. All particles approach an electric field at the same speed. Which diagram indicates the deflection of these particles as they pass through the electric field?



5 Use of the Data Booklet is relevant to this question.

Under acidic conditions, potassium manganate(VII) reacts with potassium iodide. The iodine that was liberated can be determined by titrating with sodium thiosulfate solution. The relevant equations are shown but not balanced.



What are the values of **a** and **b** in the correctly balanced equations?

	a	b
A	10	1
B	10	2
C	5	1
D	5	2

6 Use of the Data Booklet is relevant to this question.

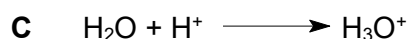
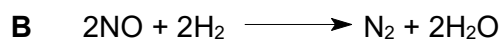
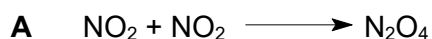
The complete combustion of 0.0050 mol of hydrocarbon **W** requires 0.540 dm³ of oxygen measured at r.t.p.

0.27 g of water is produced.

What is the molecular formula of **W**?

- A** C₂H₆ **B** C₃H₆ **C** C₃H₈ **D** C₄H₈

7 Which equation shows a reaction in which co-ordinate (dative covalent) bonds are formed?



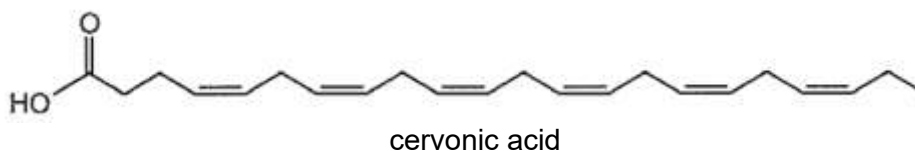
- 8 Sulfur dioxide is a very important compound in winemaking.

Sulfur dioxide can be represented as $\text{O}=\ddot{\text{S}}=\text{O}$.

Which statements about sulfur dioxide is true about its polarity and its bond angle.

- A Sulfur dioxide is polar and has a bond angle of 90° exactly.
- B Sulfur dioxide is non-polar and has a bond angle of 104° approximately.
- C Sulfur dioxide is polar and has a bond angle of 118° approximately.
- D Sulfur dioxide is non-polar and has a bond angle of 180° exactly

- 9 Cervonic acid is an omega-3 fatty acid.



Which type of intermolecular force will operate between the hydrocarbon chains of cervonic acid?

- A covalent bonding
 - B hydrogen bonding
 - C instantaneous dipole-induced dipole
 - D permanent dipole-permanent dipole
- 10 Which compound has the most negative lattice energy?
- | | |
|----------------------|-------------------|
| A Rubidium fluoride | B Rubidium oxide |
| C Potassium fluoride | D Potassium oxide |

- A** $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \longrightarrow \text{H}_2\text{O}(\text{l})$
- B** $\text{H}_2(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \longrightarrow \text{H}_2\text{O}(\text{g})$
- C** $2\text{H}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow \text{H}_2\text{O}(\text{l})$
- D** $\text{H}^+(\text{aq}) + \text{OH}^-(\text{g}) \longrightarrow \text{H}_2\text{O}(\text{l})$

- 1 Enthalpy change of combustion and enthalpy change of neutralisation
- 2 Enthalpy change of formation and lattice energy
- 3 Bond energy and enthalpy change of combustion

- A** 1, 2 and 3 **B** 1 and 3
C 2 and 3 **D** 1 only

- $$\begin{array}{cc} \text{H} & \text{H} \\ & \diagdown \quad \diagup \\ & \text{N} - \text{N} \\ & \diagup \quad \diagdown \\ \text{H} & \text{H} \end{array}$$

hydrazine

- A** +96 kJ mol⁻¹ **B** -96 kJ mol⁻¹
- C** +250 kJ mol⁻¹ **D** -250 kJ mol⁻¹

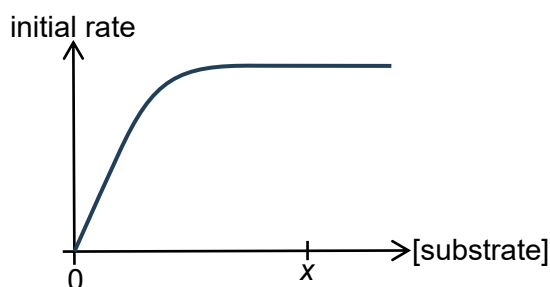
- 14** Compound **K** decomposes by a first order kinetics.

At the start of the reaction, the concentration of **K** was $0.960 \text{ mol dm}^{-3}$. This concentration decreased to $0.240 \text{ mol dm}^{-3}$ after 100 minutes.

How many minutes will it take for the concentration of **K** to decrease from 0.80 mol dm^{-3} to 0.10 mol dm^{-3} ?

- A** 48 min **B** 50 min
C 100 min **D** 150 min

- 15** The graph shows how the initial rate of reaction varies for an enzyme catalysed reaction as the substrate concentration changes.



Which statement correctly describe the situation when $[\text{substrate}] = x$?

- A** The initial rate is dependent on $[\text{substrate}]$.
B There are no more enzyme active sites available.
C The enzyme lost its catalytic function.
D The order of reaction with respect to substrate is 1.

- 16** Four successive elements, **W**, **X**, **Y** and **Z**, from the third period of the Periodic Table, were separately heated in dry oxygen.

The table shows the observations made during these reactions.

element	observation
W	Very vigorous reaction forming oxide
X	Vigorous reaction first forming oxide, oxide layer prevents further reaction
Y	Slow reaction forming oxide
Z	Vigorous reaction forming mixture of oxides

Which elements are respectively **W**, **X**, **Y** and **Z**?

- A** Al, Si, P, S
- B** Na, Mg, Al, Si
- C** Mg, Al, Si, P
- D** Si, P, S, Cl
- 17** Molecule **G** contains two elements, one from the second period and one from the third period of the Periodic Table.

One of the elements has the smallest atomic radius in both periods (excluding Group 18, the noble gases), while the other element has three electrons only in its p sub-shell in its outermost quantum shell.

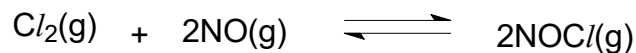
What is the formula of molecule **G**?

- A** AlF_3 **B** BCl_3 **C** PF_3 **D** LiCl
- 18** Which statements about elements in Group 1 of the Periodic Table are correct?

- 1 Oxidising power increases down the group.
- 2 Sodium is more electronegative than caesium.
- 3 They only form stable compounds with +1 oxidation state.

- A** 3 only
- B** 1 and 3 only
- C** 2 and 3 only
- D** All of the above.

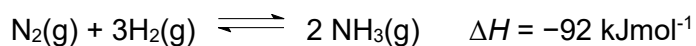
- 19** A mixture of 2 mol of chlorine and 1 mol of nitrogen monoxide is allowed to come to equilibrium at a given temperature. The equilibrium mixture contains x mol of NOCl.



What are the amounts of the other constituents of the equilibrium mixture?

	Cl_2 / mol	NO / mol
A	$2 - x$	$1 - 2x$
B	$2 - 0.5x$	$1 - x$
C	$1 - 0.5x$	$2 - x$
D	$1 - x$	$2 - 2x$

- 20** Which changes in conditions would result in no change in the value of the equilibrium constant, K_c , for the following reaction?



- 1 Increasing the concentration of N_2
- 2 Increasing the total pressure
- 3 Adding a catalyst

- A** 1, 2 and 3
B 1 and 2 only
C 2 and 3 only
D 3 only

- 21 Values for the ionic product of water, K_w , at two different temperatures are given below.

Temperature/ °C	$K_w / \text{mol}^2 \text{dm}^{-6}$
25	1.00×10^{-14}
30	1.44×10^{-14}

What is correct for pure water at 30 °C?

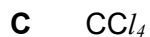
- A $[\text{H}^+] > [\text{OH}^-]$
- B $[\text{H}^+] = 1.44 \times 10^{-7}$
- C $\text{pH} < 7$
- D $\text{pH} = 7$
- 22 Which of the following solutions, when mixed in equal volumes, will produce a buffer solution?
- A $0.04 \text{ mol dm}^{-3} \text{ NaOH(aq)}$ and $0.02 \text{ mol dm}^{-3} \text{ HCl(aq)}$
- B $0.01 \text{ mol dm}^{-3} \text{ NH}_3\text{(aq)}$ and $0.02 \text{ mol dm}^{-3} \text{ HNO}_3\text{(aq)}$
- C $0.02 \text{ mol dm}^{-3} \text{ NaOH(aq)}$ and $0.01 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH(aq)}$
- D $0.01 \text{ mol dm}^{-3} \text{ NaOH(aq)}$ and $0.02 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH(aq)}$
- 23 The table shows some data on two acid-base indicators.

Indicator	Approximate pH range of colour change	Colour change	
		acid	alkali
Bromocresol-green	3.8 – 5.5	yellow	blue
Phenol-red	6.8 – 8.5	yellow	red

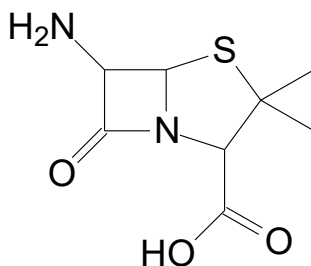
Which conclusion can be drawn about a solution in which bromocresol-green is blue and phenol-red is yellow?

- A It is weakly acidic.
- B It is neutral.
- C It is weakly alkaline.
- D It is strongly alkaline.

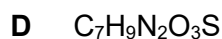
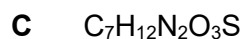
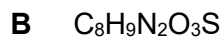
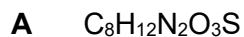
24 Which of the following is not a product of the chlorination of methane in the presence of ultraviolet light?



25 Penicillins are important anti-bacterial agents. The active penicillins are derivatives of the compound shown.



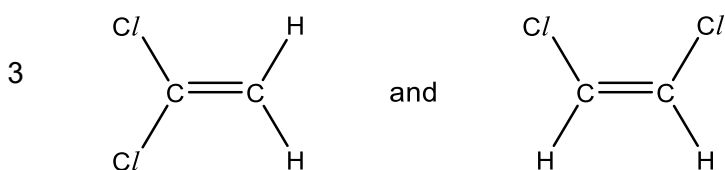
What is the molecular formula of the above molecule?



26 Which pairs of molecules are constitutional (structural) isomers?

1 Propanoic acid and methyl ethanoate

2 Butanone and 2-methylpropanal



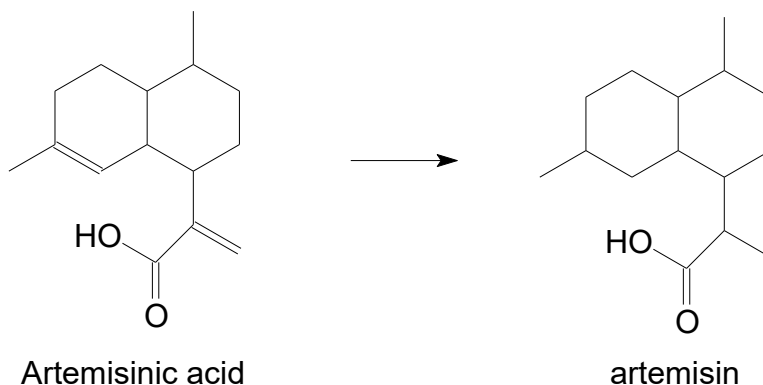
A 1 and 2 only

B 2 and 3 only

C 1 and 3 only

D All of the above

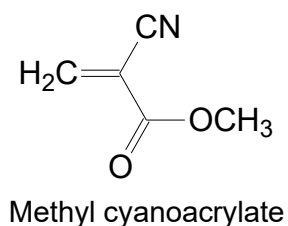
- 27 Artemisinic acid is a useful intermediate for making the anti-malarial drug, artemisin.



Which row shows the correct information about the above reaction?

	Type of reaction	Reagents and condition
A	addition	H ₂ , uv light
B	elimination	NaOH in ethanol, heat
C	reduction	H ₂ , Ni, heat
D	reduction	NaBH ₄ in methanol

- 28 The major component of 'superglue' is methyl cyanoacrylate, which polymerises as the glue sets.



Which statement about this compound is **not** correct?

[You may assume -CN group is inert.]

- A** It can decolourises bromine water.
- B** It can be hydrolysed into propenoic acid.
- C** It forms instantaneous dipole-induced dipole interactions with poly(ethene).
- D** It forms hydrogen bondings with water molecules.

29 Which of the following statements are true for thermoplastic polymers but not true for thermoset polymers?

- 1 The polymer burns upon heating.
- 2 The polymer can be recycled.
- 3 There is little or no cross-linkages between polymer chains.

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

30 Which of the following statements does **not** explain the climbing ability of geckos?

- A** The gecko's spatulae can deform to enable maximum contact with the wall.
- B** The gecko's spatulae form hydrogen bonding with the surface of the wall.
- C** The gecko's spatulae possess a high surface area to volume ratio.
- D** There are billions of spatulae per gecko.

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