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Chemistry

Standard level

Paper 1A

15 May 2026

Zone A afternoon | **Zone B** afternoon | **Zone C** afternoon

1 hour 30 minutes [Paper 1A and Paper 1B]

Instructions to students

- Do not open this examination paper until instructed to do so.
- Answer all questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.
- A calculator is required for this paper.
- A clean copy of the **chemistry data booklet** is required for this paper.
- The maximum mark for paper 1A is **[30 marks]**.
- The maximum mark for paper 1A and paper 1B is **[55 marks]**.

Section A

1. Which equation represents the deposition of iodine?
 - A. $\text{I}_2(\text{s}) \rightarrow \text{I}_2(\text{l})$
 - B. $\text{I}_2(\text{s}) \rightarrow \text{I}_2(\text{g})$
 - C. $\text{I}_2(\text{l}) \rightarrow \text{I}_2(\text{s})$
 - D. $\text{I}_2(\text{g}) \rightarrow \text{I}_2(\text{s})$

2. What is correct about $^{34}\text{S}^{2-}$?
 - A. It has the same number of protons as $^{16}\text{O}^{2-}$
 - B. It has the same number of neutrons as $^{35}\text{Cl}^-$
 - C. It has two more electrons than $^{40}\text{Ca}^{2+}$
 - D. It has two more protons than ^{36}Ar

3. What is observed in the emission spectrum of hydrogen?
 - A. Continuous spectrum with narrow black lines that converge at higher energies
 - B. Continuous spectrum with narrow black lines that converge at longer wavelength
 - C. Series of narrow lines that converge at longer wavelength
 - D. Series of narrow lines that converge at higher frequencies

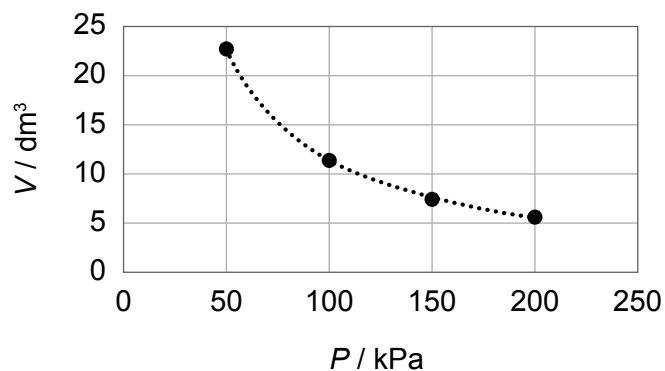
4. How many hydrogen atoms are in 0.250 moles of phenylamine $\text{C}_6\text{H}_5\text{NH}_2$?

$$N_{\text{A}} = 6.02 \times 10^{23} \text{ mol}^{-1}$$

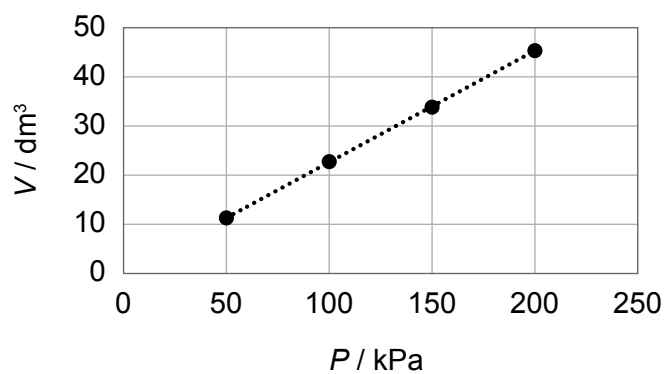
- A. 1.05×10^{24}
- B. 1.05×10^{23}
- C. 4.21×10^{24}
- D. 1.75

5. What is the graphical relationship between P and V when **0.5 moles** of an ideal gas are kept at standard temperature? ($V_m = 22.7 \text{ dm}^3 \text{ mol}^{-1}$)

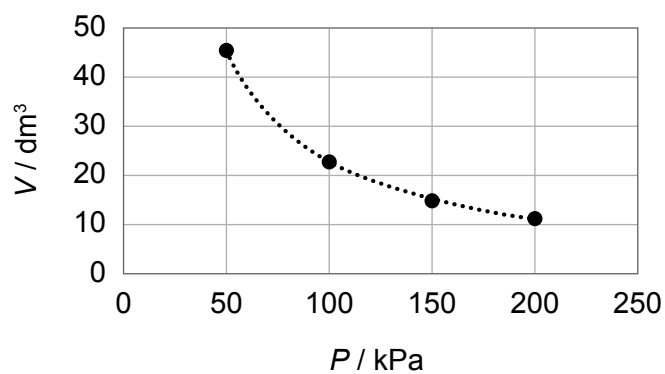
A.



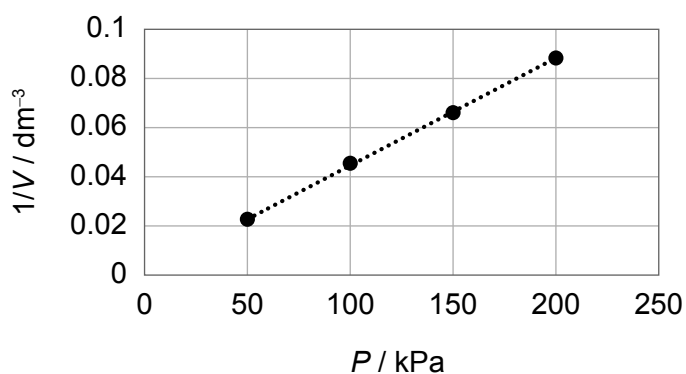
B.



C.



D.



6. Hydrated Mohr's salt has the formula $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$.

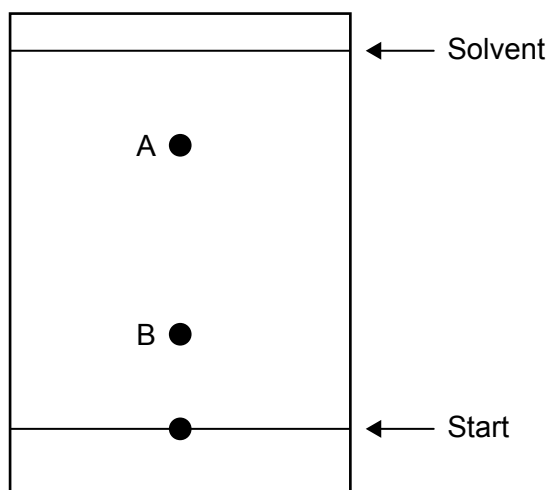
What are the charges of its constituent ions?

A.	Fe^{3+}	NH_4^+	SO_4^{2-}
B.	Fe^{2+}	NH_4^{2+}	SO_4^{3-}
C.	Fe^{2+}	NH_4^+	SO_4^{2-}
D.	Fe^{3+}	NH_4^{2+}	SO_4^{2-}

7. What is correct for substances containing carbon and silicon?

- A. Carbon dioxide and silicon dioxide have the same electron domain geometry around the central atom.
- B. Carbon and silicon only form covalent compounds with low boiling point.
- C. Elemental silicon and silicon dioxide have the same electron domain geometry around the central atom.
- D. Elemental carbon and carbon dioxide both have a high boiling point.

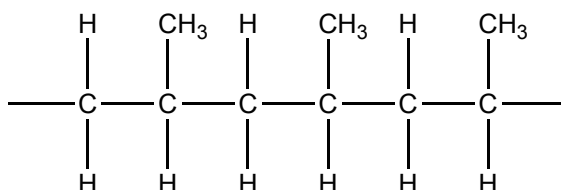
8. The thin layer chromatogram of a mixture of compounds A and B shows the following pattern.



Which combination best represents this chromatogram?

	Estimated R_f	More attracted to mobile phase
A.	0.25 compound B	Compound A
B.	0.75 compound A	Compound B
C.	1.33 compound A	Compound A
D.	4.00 compound B	Compound B

9. Which series shows the correct order of metallic bond strength from **weakest to strongest**?
- A. Al, Mg, K, Na
- B. K, Na, Mg, Al
- C. Na, Mg, Al, K
- D. Al, Mg, Na, K
10. The diagram shows a portion of an addition polymer.



Which monomer is used to make this polymer?

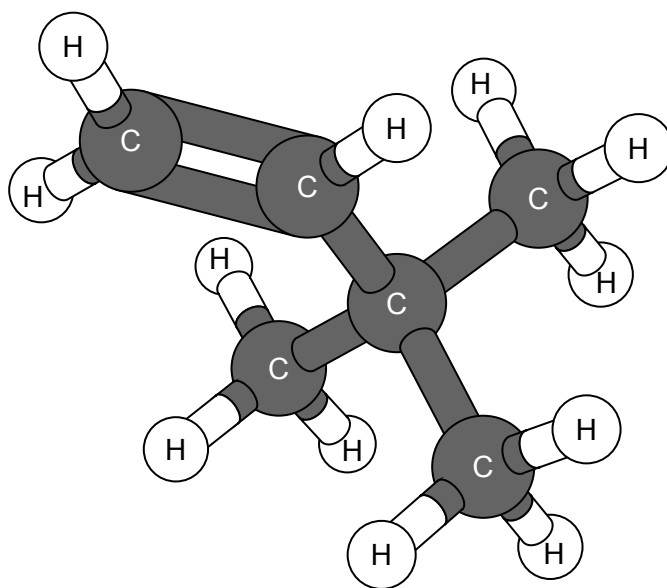
- A. $\text{CH}_3\text{CH}_2\text{CH}_3$
- B. $\text{CH}_3\text{CHCHCH}_3$
- C. CH_2CHCH_3
- D. $(\text{CH}_3)_2\text{CHCH}_2$
11. What describes the trend in properties of group 1 elements **down** the group?

	Metallic character	Reaction with water	pH of solution
A.	Decreases	Less vigorous	Acidic
B.	Increases	More vigorous	Acidic
C.	Decreases	More vigorous	Basic
D.	Increases	More vigorous	Basic

12. Which electron configuration is possible for a **p block** element?

- A. $[\text{Ne}]2s^23d^{10}4p^4$
- B. $[\text{Ar}]4s^23d^84p^6$
- C. $[\text{Ar}]4s^23d^{10}4p^4$
- D. $[\text{Ne}]3s^23d^{10}3p^4$

13. What are the structural isomers of this compound?

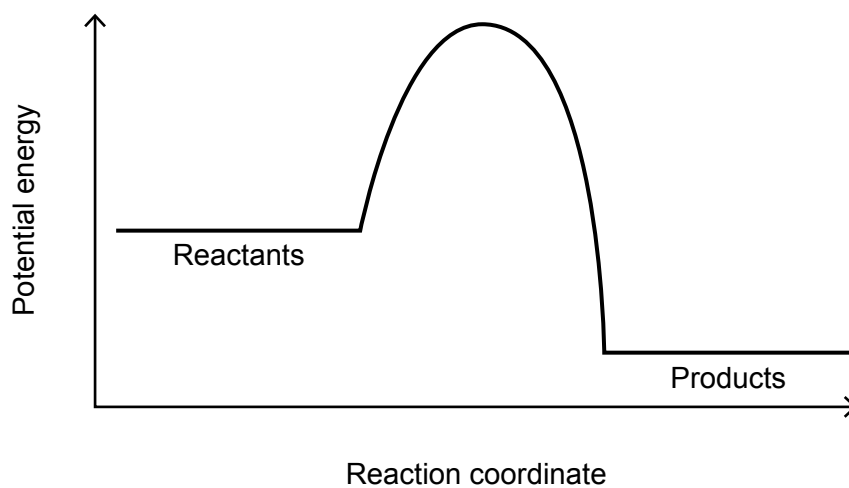


- I. 3-ethylpent-1-ene
 - II. hex-3-ene
 - III. 3-methylpent-2-ene
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III

14. What is the general formula of an unsaturated compound?

- A. $C_nH_{2n+1}Cl$
- B. C_nH_{2n}
- C. $C_nH_{2n+1}OH$
- D. C_nH_{2n+2}

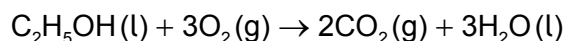
15. The potential energy profile for a reaction is shown.



What is a possible enthalpy change (ΔH) for this reaction?

- A. $+733 - 504$
- B. $+504 + 733$
- C. $-504 + 733$
- D. $-733 + 504$

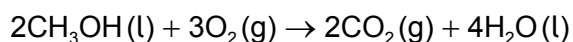
16. The enthalpy change (ΔH) for the combustion of ethanol is calculated from bond enthalpy data and compared with the literature value.



From bond enthalpy values ΔH (kJ mol^{-1})	Literature value $\Delta H^\ominus$ (kJ mol^{-1})
–1263	–1367

What could explain the difference between the values?

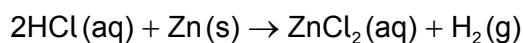
- A. The literature value is not reliable.
- B. Bond enthalpy values refer to compounds in the standard state.
- C. The literature value refers to compounds in the gaseous state.
- D. Bond enthalpy values refer to compounds in the gaseous state.
17. What is correct about the reactions at the electrodes in a direct methanol fuel cell?



	At the cathode	At the anode
A.	Oxygen gains electrons	Methanol is oxidized
B.	Hydrogen gains electrons	Oxygen is oxidized
C.	Oxygen is reduced	Methanol gains electrons
D.	Hydrogen gains electrons	Methanol is oxidized

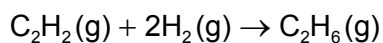
18. Which of the following will produce the greatest amount of hydrogen gas in reaction with excess zinc metal?

$$M_r(\text{HCl}) = 36.56, V_m = 22.7 \text{ dm}^3 \text{ mol}^{-1}$$



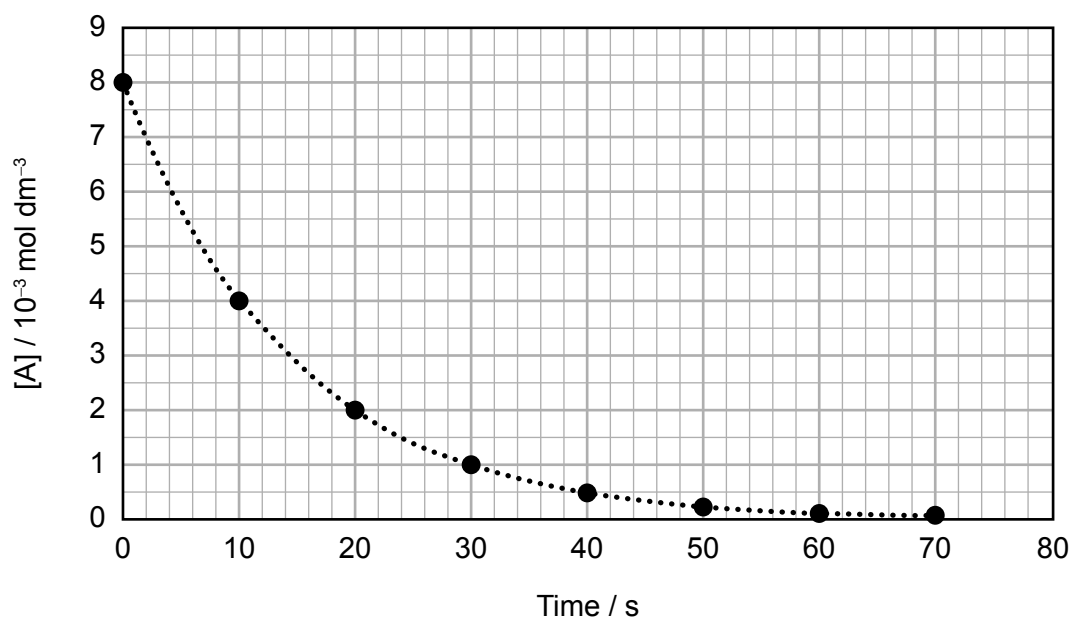
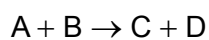
- A. 0.365 g HCl(g)
- B. 20.0 cm³ of 1.00 mol dm^{–3} HCl(aq)
- C. 2.27 dm³ HCl(g) at STP
- D. 0.0500 moles HCl(g)

19. $60 \text{ dm}^3 \text{ C}_2\text{H}_2$ and 80 dm^3 hydrogen react to produce C_2H_6 , all measured at the same temperature and pressure.



What is the percentage yield if 30 dm^3 of C_2H_6 is produced?

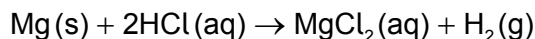
- A. 21 %
 B. 30 %
 C. 50 %
 D. 75 %
20. The graph shows the change in concentration of reactant A over time.



How does the instantaneous rate of this reaction with respect to reactant A change between 5 and 25 s?

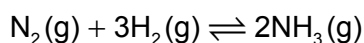
- A. Increases 4 times
 B. Decreases 4 times
 C. Decreases 18 times
 D. Increases 18 times

21. Which changes will increase the **initial rate** of the reaction between 100 cm^3 of 1.0 mol dm^{-3} HCl(aq) and excess magnesium ribbon, Mg(s) ?



- I. Using 200 cm^3 of 1.0 mol dm^{-3} HCl
- II. Increasing the temperature
- III. Using the same mass of powdered magnesium

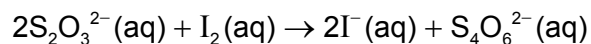
- A. I and II only
 - B. I and III only
 - C. II and III only
 - D. I, II and III
22. The following equilibrium represents the synthesis of ammonia at a given temperature.



$$K = 5.0 \times 10^{-5}$$

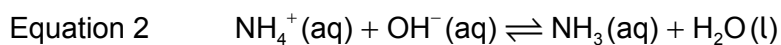
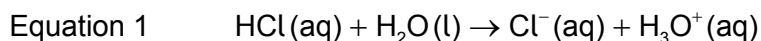
What is the value for the equilibrium constant of the **reverse reaction** at the same temperature?

- A. 2.5×10^{-5}
 - B. 5.0×10^{-4}
 - C. 2.0×10^4
 - D. 5.0×10^5
23. What is correct for the reaction between iodine and thiosulfate ions?



- A. Iodine is the reducing agent.
- B. $\text{S}_2\text{O}_3^{2-}$ is the oxidizing agent.
- C. $\text{S}_4\text{O}_6^{2-}$ is oxidized.
- D. Iodine is reduced.

24. These equations represent acid–base reactions:



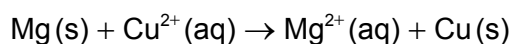
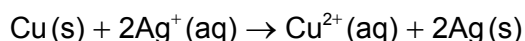
Which combination is correct?

	Equation 1	Equation 2
A.	H ₂ O behaves as a Brønsted–Lowry acid	NH ₃ behaves as a Brønsted–Lowry base
B.	H ₂ O behaves as a Brønsted–Lowry base	NH ₄ ⁺ behaves as a Brønsted–Lowry acid
C.	HCl behaves as a Brønsted–Lowry acid	H ₂ O behaves as a Brønsted–Lowry base
D.	HCl behaves as a Brønsted–Lowry base	OH [–] behaves as a Brønsted–Lowry base

25. Which of the following relationships is correct?

- A. The lower the pH, the lower the [OH[–]]
- B. The lower the pH, the higher the [OH[–]]
- C. The higher the pH, the higher the [H⁺]
- D. The lower the pH, the lower the [H⁺]

26. The following reactions proceed spontaneously at room temperature.



What could be deduced for a primary voltaic cell made with the half-cells Ag(s)/Ag⁺(aq) and Mg(s)/Mg²⁺(aq)?

- A. The Mg anode will oxidize.
- B. Ag⁺ will oxidize.
- C. The Ag anode will oxidize.
- D. Mg²⁺ will oxidize.

27. How many structural isomers of alcohols with the molecular formula C_4H_9OH will undergo oxidation with acidified potassium dichromate(VI)?
- 2
 - 3
 - 4
 - 5
28. What is the product of the reaction between $(CH_3)_2CHC\equiv CH$ and excess $H_2(g)$?
- 2-methylbutane
 - 3-methylbutane
 - 1,1-dimethylpropane
 - Pentane
29. Which compound is susceptible to electrophilic attack?
- C_6H_{12}
 - C_6H_{14}
 - $C_6H_{13}Cl$
 - $C(CH_3)_4$
30. Which reactions represent nucleophilic substitution?
- $OH^- + CH_3CH_2Cl \rightarrow CH_3CH_2OH + Cl^-$
 - $OH^- + CH_3CH_2Cl \rightarrow CH_2CH_2 + Cl^- + H_2O$
 - $N_3^- + CH_3Cl \rightarrow CH_3N_3 + Cl^-$
- I and II only
 - I and III only
 - II and III only
 - I, II and III
-

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