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CLASS 11

Chemistry

Sample Paper 4 - Questions

33 questions | 70 marks | 2026-27

Time: 3 hours. Answer all questions and subparts unless a choice is stated. Marks are shown on the right. Write answers on separate sheets. Independently prepared practice paper.

Section A - Objective questions

1. Which statement correctly describes Enthalpy? **1**

(A) Electronic structure produces systematic property changes across the periodic table.

(B) An atom's tendency to attract shared electron density is described.

(C) Degenerate orbitals are singly occupied with parallel spins before pairing in the usual ground-state arrangement.

(D) A thermodynamic state function combines internal energy with pressure-volume terms.

2. Which concept is illustrated in this example? A reaction cannot produce more product after its limiting reactant is consumed. **1**

(A) Le Chatelier's principle

(B) Limiting reagent

(C) Enthalpy

(D) Periodic trend

3. Which statement correctly describes Periodic trend? 1

(A) A thermodynamic state function combines internal energy with pressure-volume terms.

(B) Atomic orbitals are combined in a model to describe suitable bonding arrangements.

(C) An equilibrium system responds to a disturbance in a direction opposing its effect.

(D) Electronic structure produces systematic property changes across the periodic table.

4. Which concept is illustrated in this example? Known reaction enthalpies are combined to obtain a target enthalpy. 1

(A) Electrophile

(B) Hund's rule

(C) Limiting reagent

(D) Hess's law

5. Which statement correctly describes Pauli principle? 1

(A) Degenerate orbitals are singly occupied with parallel spins before pairing in the usual ground-state arrangement.

(B) Two electrons in an atom cannot have the same four quantum numbers.

(C) Amount of substance is linked with a specified number of entities.

(D) Electron displacement through sigma bonds influences reactivity.

6. Which concept is illustrated in this example? An increase in oxidation number indicates oxidation. 1

(A) Hund's rule

(B) Electronegativity

(C) Oxidation number

(D) Aufbau principle

7. Which statement correctly describes Electrophile? 1

(A) A thermodynamic state function combines internal energy with pressure-volume terms.

(B) An electron-pair acceptor reacts with electron-rich sites.

(C) Amount of substance is linked with a specified number of entities.

(D) A suitable hydrogen-containing group interacts with an electronegative atom's electron density.

8. Which concept is illustrated in this example? Compression favours fewer gas particles when comparing suitable gas equilibria. **1**

(A) Atomic orbital
(B) Le Chatelier's principle
(C) Mole
(D) Aufbau principle

9. Which concept is illustrated in this example? A bond cleavage produces free radicals. **1**

(A) Limiting reagent
(B) Homolytic fission
(C) Hybridisation
(D) Pauli principle

10. Which statement correctly describes Inductive effect? **1**

(A) Electron displacement through sigma bonds influences reactivity.
(B) Reaction enthalpy depends on initial and final states, not the chosen path.
(C) A reactant exhausted first limits the possible product amount.
(D) A wavefunction describes an electron state with associated probability information.

11. Which concept is illustrated in this example? A bond can become polar when bonded atoms attract electrons differently. **1**

(A) Mole
(B) Le Chatelier's principle
(C) Dynamic equilibrium
(D) Electronegativity

12. Which concept is illustrated in this example? sp3 hybridisation is associated with a tetrahedral electron-pair arrangement. **1**

(A) Hybridisation
(B) Mole
(C) Pauli principle
(D) Aufbau principle

13. Which concept is illustrated in this example? Concentrations stay constant while both reaction directions continue. 1

(A) Dynamic equilibrium
(B) Limiting reagent
(C) Hund's rule
(D) Aufbau principle

14. Which concept is illustrated in this example? Molar mass converts a sample's mass to amount of substance. 1

(A) Mole
(B) Aufbau principle
(C) Electronegativity
(D) Le Chatelier's principle

15. Which statement correctly describes Aufbau principle? 1

(A) Lower-energy orbitals are generally filled before higher-energy orbitals in ground-state configurations.
(B) A formal electron-accounting value helps identify redox changes.
(C) Electronic structure produces systematic property changes across the periodic table.
(D) A thermodynamic state function combines internal energy with pressure-volume terms.

16. Which statement correctly describes Atomic orbital? 1

(A) Atomic orbitals are combined in a model to describe suitable bonding arrangements.
(B) Amount of substance is linked with a specified number of entities.
(C) Two electrons in an atom cannot have the same four quantum numbers.
(D) A wavefunction describes an electron state with associated probability information.

Section B - Short responses

17. A neutral atom has atomic number 35 and mass number 72. Calculate its number of neutrons. 2

18. State the meaning of Hund's rule. Identify a relevant feature in this situation: Electrons enter separate p orbitals before pairing. 2

19. Two steps have enthalpy changes -520 and 130 kJ/mol. Calculate the sum for the overall path. 2

20. Compare Hydrogen bonding and Mole. Give the meaning and an appropriate application of each. 2

21. Calculate moles in 522 g of water, using molar mass 18 g/mol. 2

Section C - Short responses

22. Compare Atomic orbital and Pauli principle. Give the meaning and an appropriate application of each. 3

23. In $2H2 + O_2$ -> $2H2O$, how many moles of water form from 58 mol H_2 with excess O_2? 3

24. State the meaning of Le Chatelier's principle. Identify a relevant feature in this situation: Compression favours fewer gas particles when comparing suitable gas equilibria. 3

25. For A <=> B, equilibrium concentrations are [A] = 0.20 mol/L and [B] = 3.10 mol/L. Calculate Kc. 3

26. State the meaning of Homolytic fission. Identify a relevant feature in this situation: A bond cleavage produces free radicals. 3

27. A neutral atom has atomic number 36 and mass number 74. Calculate its number of neutrons. 3

28. State the meaning of Electronegativity. Identify a relevant feature in this situation: A bond can become polar when bonded atoms attract electrons differently. 3

Section D - Case and application questions

29. Consider this situation: sp3 hybridisation is associated with a tetrahedral electron-pair arrangement.

(a) Name the concept demonstrated in the case. 1

(b) Explain the connection between the situation and that concept. 1

(c) Distinguish that concept from Aufbau principle, giving an appropriate feature of each. 2

30. Consider this situation: An increase in oxidation number indicates oxidation.

(a) Name the concept demonstrated in the case. 1

(b) Explain the connection between the situation and that concept. 1

(c) Distinguish that concept from Atomic orbital, giving an appropriate feature of each. 2

Section E - Extended responses

31. (a) Explain Hund's rule and analyse this application: Electrons enter separate p orbitals before pairing. 5
(b) Explain Aufbau principle and show how this second application fits it: An electron configuration is constructed using the appropriate energy ordering.

32. (a) Explain Hydrogen bonding and analyse this application: Intermolecular interactions influence water's properties. 5
(b) Explain Mole and show how this second application fits it: Molar mass converts a sample's mass to amount of substance.

33. (a) Explain Enthalpy and analyse this application: Heat at constant pressure equals enthalpy change under suitable conditions. 5
(b) Explain Dynamic equilibrium and show how this second application fits it: Concentrations stay constant while both reaction directions continue.

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