

MDCAT CHEMISTRY PRACTICE QUESTION BANK

Complete 1000 High-Yield MCQs with Statements, Options, Correct Answers & Concepts/Tips

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MCQ 0001 / 1000

1. Stoichiometry & Moles

1. The number of particles present in 1 mole of any substance is called?

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ Correct Answer: C 💡 Concept / Tip: One mole contains 6.022×10^{23} representative particles.

MCQ 0002 / 1000

2. Atomic Structure & Quantum Theory

2. One mole of $C_{12}H_{22}O_{11}$ (sucrose) has a molar mass of?

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ Correct Answer: B 💡 Concept / Tip: $12(12) + 22(1) + 11(16) = 342$ g/mol.

MCQ 0003 / 1000

3. Gas Laws & Kinetic Molecular Theory

3. To identify the limiting reagent, available moles of each reactant are compared with?

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ Correct Answer: D 💡 Concept / Tip: Divide moles available by stoichiometric coefficient.

MCQ 0004 / 1000

4. Liquids & Hydrogen Bonding

4. At STP, one mole of an ideal gas occupies a volume of?

- A. 11.2 dm³
B. 44.8 dm³
C. 24.0 dm³
D. 22.4 dm³

✓ Correct Answer: D 💡 Concept / Tip: Standard molar volume at 0°C and 1 atm is 22.4 dm³.

MCQ 0005 / 1000

5. Solids & Lattice Energy

5. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield?

- A. 90%
B. 80%
C. 75%
D. 95%

✓ Correct Answer: A 💡 Concept / Tip: Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0006 / 1000

6. Chemical Equilibrium & Le Chatelier

6. In $2H_2 + O_2 \rightarrow 2H_2O$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is?

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ Correct Answer: C 💡 Concept / Tip: 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0007 / 1000

7. Reaction Kinetics & Activation Energy

7. The maximum amount of product predicted by stoichiometric calculations is?

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ Correct Answer: C 💡 Concept / Tip: Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0008 / 1000

8. Thermochemistry & Energetics

8. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to?

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ Correct Answer: C 💡 Concept / Tip: $V \propto n$ at constant T and P.

MCQ 0009 / 1000

9. Electrochemistry & Redox

9. For an ionic compound, the representative particle is best termed a?

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0010 / 1000

10. Chemical Bonding, VSEPR & Hybridization

10. Mass of 0.5 mole of water (H₂O) is?

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A** 💡 **Concept / Tip:** Mass = n × M = 0.5 × 18 = 9 g.

MCQ 0011 / 1000

11. s- and p-Block Elements

11. For n = 3, the allowed values of the azimuthal quantum number (l) are?

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D** 💡 **Concept / Tip:** l ranges from 0 to (n - 1).

MCQ 0012 / 1000

12. Transition Elements & Coordination

12. The azimuthal quantum number (l) specifies the?

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0013 / 1000

13. Fundamental Organic Chemistry & Isomerism

13. The ground-state electronic configuration of Chromium (Z = 24) is?

- A. [Ar] 3d⁴ 4s²
B. [Ar] 3d⁵ 4s¹
C. [Ar] 3d³ 4s³
D. [Ar] 3d⁶ 4s⁰

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d⁵ configuration imparts extra stability.

MCQ 0014 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

14. The Lyman series in the hydrogen spectrum lies in which electromagnetic region?

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at n = 1 (UV region).

MCQ 0015 / 1000

15. Alkyl Halides (S_N1, S_N2, E1, E2)**15. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with?**

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0016 / 1000

16. Alcohols & Phenols

16. The total number of orbitals present in the n = 3 shell is?

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = n² = 3² = 9.

MCQ 0017 / 1000

17. Aldehydes & Ketones

17. Positive rays (canal rays) were discovered by?

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0018 / 1000

18. Carboxylic Acids & Derivatives

18. Hund's rule states that degenerate orbitals are occupied?

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0019 / 1000

19. Macromolecules (Proteins & Enzymes)

19. An s orbital has what geometric shape?

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0020 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

20. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at?

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0021 / 1000

1. Stoichiometry & Moles

21. At constant temperature, the volume of a gas is inversely proportional to pressure according to?

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B** 💡 **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0022 / 1000

2. Atomic Structure & Quantum Theory

22. Ideal gas behavior is best approached under which conditions?

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0023 / 1000

3. Gas Laws & Kinetic Molecular Theory

23. The SI unit of the universal gas constant R is?

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0024 / 1000

4. Liquids & Hydrogen Bonding

24. Absolute zero corresponds to approximately?

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C** 💡 **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0025 / 1000

5. Solids & Lattice Energy

25. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of?

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1 / \sqrt{M}$.

MCQ 0026 / 1000

6. Chemical Equilibrium & Le Chatelier

26. Dalton's law applies to mixtures of gases that are?

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

7. Reaction Kinetics & Activation Energy

A. 1.5 dm^3
C. 9 dm^3

B. 6 dm^3

D. 12 dm^3

8. Thermochemistry & Energetics

A. Have no mass

C. Do not collide

B. Have finite volume and attractions

D. Have zero kinetic energy

9. Electrochemistry & Redox

A. Volume

C. Absolute temperature

B. Pressure

D. Molar mass

10. Chemical Bonding, VSEPR & Hybridization

A. 298 K, 1 atm
C. 0 K, 1 atm

D. 373 K, 1 atm

11. s- and p-Block Elements

A. Ionic bonding

C. Open hydrogen-bonded structure

B. Covalent bonding

D. Metallic bonding

12. Transition Elements & Coordination

A. Internal pressure
C. Zero pressure

B. External atmospheric pressure
D. Critical pressure

13. Fundamental Organic Chemistry & Isomerism

A. Lowest kinetic energy
C. Zero energy

B. Highest kinetic energy
D. Constant energy

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

A. C, Si, P
C. Na, K, Ca

B. N, O, F
D. Cl, Br, I

15. Alkyl Halides (SN1, SN2, E1, E2)

A. Stronger than in gases
C. Equal to gases

B. Weaker than in gases
D. Zero

MCQ 0036 / 1000

16. Alcohols & Phenols

36. Surface tension arises due to?

- A. Unbalanced inward cohesive forces at the surface
 B. Equal forces in all directions
 C. Gravitational force only
 D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0037 / 1000

17. Aldehydes & Ketones

37. A volatile liquid generally possesses?

- A. Strong intermolecular forces and high boiling point
 B. Weak intermolecular forces and high vapor pressure
 C. High boiling point and low vapor pressure
 D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0038 / 1000

18. Carboxylic Acids & Derivatives

38. Viscosity of a liquid generally decreases as temperature?

- A. Decreases
 B. Increases
 C. Remains constant
 D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0039 / 1000

19. Macromolecules (Proteins & Enzymes)

39. Which liquid exhibits the strongest hydrogen bonding?

- A. CH₄
 B. H₂S
 C. H₂O
 D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0040 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

40. Capillary action of liquids is driven by the balance between?

- A. Gravity and mass
 B. Adhesion and cohesion
 C. Density and volume
 D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0041 / 1000

1. Stoichiometry & Moles

41. A crystalline solid differs from an amorphous solid in possessing?

- A. Sharp melting point and long-range order
 B. Gradual softening range
 C. Isotropic properties only
 D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0042 / 1000

2. Atomic Structure & Quantum Theory

42. Covalent network solids like diamond are characterized by?

- A. Low melting point
 B. Extreme hardness and high melting point
 C. High electrical conductivity as solid
 D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0043 / 1000

3. Gas Laws & Kinetic Molecular Theory

43. Lattice energy is defined as energy released when?

- A. 1 mole of solid melts
 B. Gaseous ions form 1 mole of ionic solid
 C. Solid dissolves in water
 D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0044 / 1000

4. Liquids & Hydrogen Bonding

44. Comparing NaCl and MgO, MgO has a much higher lattice energy because?

- A. Mg²⁺ and O²⁻ have higher ionic charges
 B. Na⁺ is smaller than Mg²⁺
 C. Cl⁻ is smaller than O²⁻
 D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0045 / 1000

5. Solids & Lattice Energy

45. Ionic solids conduct electricity?

- A. In solid state only
 B. When molten or in aqueous solution
 C. Under no conditions
 D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0046 / 1000

6. Chemical Equilibrium & Le Chatelier

46. The smallest repeating structural unit that exhibits full symmetry of a crystal is the?

- A. Atom
 B. Molecule
 C. Unit cell
 D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0047 / 1000

7. Reaction Kinetics & Activation Energy

47. Ionic crystals are brittle because shifting layers bring?

- A. Opposite charges together
 B. Like charges close together
 C. Electrons into nucleus
 D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0048 / 1000

8. Thermochemistry & Energetics

48. Molecular crystals like iodine (I₂) are held together by?

- A. Strong ionic bonds
 B. Metallic bonding
 C. Weak intermolecular forces (London forces)
 D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0049 / 1000

9. Electrochemistry & Redox

49. Anisotropy in crystalline solids means physical properties?

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0050 / 1000

10. Chemical Bonding, VSEPR & Hybridization

50. In NaCl crystal lattice, each Na⁺ ion is surrounded octahedrally by how many Cl⁻ ions?

- A. 4
 B. 6
 C. 8
 D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0051 / 1000

11. s- and p-Block Elements

51. Dynamic equilibrium in a reversible reaction is achieved when?

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0052 / 1000

12. Transition Elements & Coordination

52. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward?

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

MCQ 0053 / 1000

13. Fundamental Organic Chemistry & Isomerism

53. Adding a catalyst to a reaction at equilibrium?

- A. Increases K_c
 B. Shifts position to products
 C. Speeds up attainment of equilibrium without shifting position
 D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0054 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

54. An acidic buffer solution can be prepared by mixing?

- A. Strong acid and strong base
 B. Weak acid and its conjugate base salt
 C. Weak base and strong base
 D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0055 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

55. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is?

- A. $[\text{M}^{2+}][\text{X}^-]$
 B. $[\text{M}^{2+}][\text{X}^-]^2$
 C. $[\text{M}^{2+}]^2[\text{X}^-]$
 D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{sp} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0056 / 1000

16. Alcohols & Phenols

56. The common ion effect generally causes the solubility of a sparingly soluble salt to?

- A. Increase
 B. Decrease
 C. Remain unchanged
 D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0057 / 1000

17. Aldehydes & Ketones

57. For an exothermic forward reaction, increasing temperature shifts equilibrium toward?

- A. Products
 B. Reactants
 C. No shift
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0058 / 1000

18. Carboxylic Acids & Derivatives

58. The value of the equilibrium constant K_c changes ONLY with a change in?

- A. Pressure
 B. Concentration
 C. Temperature
 D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0059 / 1000

19. Macromolecules (Proteins & Enzymes)

59. A buffer resists drastic changes in pH upon addition of small amounts of?

- A. Only acid
 B. Only base
 C. Both acid and base
 D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0060 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

60. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by?

- A. Low pressure and high T
 B. High pressure and low T
 C. Low pressure and low T
 D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0061 / 1000

1. Stoichiometry & Moles

61. The unit of rate constant (k) for a first-order reaction is?

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
 B. s^{-1}
 C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
 D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rate = $k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0062 / 1000

2. Atomic Structure & Quantum Theory

62. A catalyst increases reaction rate primarily by?

- A. Increasing collision frequency only
 B. Lowering activation energy barrier
 C. Shifting equilibrium position
 D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0063 / 1000

3. Gas Laws & Kinetic Molecular Theory

63. If doubling [A] quadruples the rate of reaction, the order with respect to A is?

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [A]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0064 / 1000

4. Liquids & Hydrogen Bonding

64. Activation energy (E_a) is best defined as?

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0065 / 1000

5. Solids & Lattice Energy

65. A zero-order reaction has a rate that is?

- A. Directly proportional to concentration
B. Independent of reactant concentration
C. Proportional to square of concentration
D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k [A]^0 = k$.

MCQ 0066 / 1000

6. Chemical Equilibrium & Le Chatelier

66. Increasing surface area of a solid reactant increases reaction rate because?

- A. It lowers activation energy
B. It increases exposed surface for effective collisions
C. It changes equilibrium constant
D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0067 / 1000

7. Reaction Kinetics & Activation Energy

67. The half-life ($t_{1/2}$) of a first-order reaction is?

- A. Directly proportional to initial concentration
B. Inversely proportional to initial concentration
C. Independent of initial concentration
D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0068 / 1000

8. Thermochemistry & Energetics

68. The slowest elementary step in a multi-step reaction mechanism is called the?

- A. Fast step
B. Rate-determining step
C. Equilibrium step
D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0069 / 1000

9. Electrochemistry & Redox

69. Increasing temperature increases reaction rate mainly by?

- A. Decreasing reactant mass
B. Increasing fraction of molecules exceeding activation energy
C. Eliminating activation energy
D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0070 / 1000

10. Chemical Bonding, VSEPR & Hybridization

70. The activated complex (transition state) is?

- A. A stable intermediate
B. A high-energy, unstable temporary arrangement
C. The final product
D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0071 / 1000

11. s- and p-Block Elements

71. An exothermic reaction is characterized by?

- A. Positive ΔH
B. Negative ΔH
C. Zero ΔH
D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0072 / 1000

12. Transition Elements & Coordination

72. Hess's law of constant heat summation is a direct application of conservation of?

- A. Mass
B. Charge
C. Energy
D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0073 / 1000

13. Fundamental Organic Chemistry & Isomerism

73. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is?

- A. Always positive
B. Always negative
C. Defined as zero
D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0074 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

74. A state function depends on?

- A. The specific path taken
B. Initial and final states only
C. Rate of reaction
D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0075 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

75. At constant pressure, the heat change accompanying a reaction equals?

- A. Internal energy change ΔU
B. Enthalpy change ΔH
C. Work done w
D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0076 / 1000

16. Alcohols & Phenols

76. The first law of thermodynamics is expressed mathematically as?

- A. $\Delta U = q + w$
B. $\Delta H = q - w$
C. $PV = nRT$
D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0077 / 1000

17. Aldehydes & Ketones

77. Bond breaking is always an?

- A. Exothermic process
B. Endothermic process
C. Isothermal process
D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0078 / 1000

18. Carboxylic Acids & Derivatives

78. A reaction that absorbs heat from surroundings is described as?

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0079 / 1000

19. Macromolecules (Proteins & Enzymes)

79. Heat capacity is defined as the amount of heat required to raise the temperature of a body by?

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0080 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

80. In a bomb calorimeter, heat change is measured at constant?

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0081 / 1000

1. Stoichiometry & Moles

81. In an electrochemical cell, oxidation always occurs at the?

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0082 / 1000

2. Atomic Structure & Quantum Theory

82. In a galvanic (voltaic) cell, chemical energy is converted into?

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0083 / 1000

3. Gas Laws & Kinetic Molecular Theory

83. Reduction is defined as the?

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0084 / 1000

4. Liquids & Hydrogen Bonding

84. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of?

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0085 / 1000

5. Solids & Lattice Energy

85. A salt bridge in a galvanic cell serves to?

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0086 / 1000

6. Chemical Equilibrium & Le Chatelier

86. Standard cell EMF (E°_{cell}) is calculated as?

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red}}(\text{cathode}) - E^\circ_{\text{red}}(\text{anode})$.

MCQ 0087 / 1000

7. Reaction Kinetics & Activation Energy

87. A species with a highly negative standard reduction potential acts as a?

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0088 / 1000

8. Thermochemistry & Energetics

88. In the electrolysis of molten NaCl, sodium metal is deposited at the?

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0089 / 1000

9. Electrochemistry & Redox

89. The oxidation number of sulfur in H_2SO_4 is?

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0090 / 1000

10. Chemical Bonding, VSEPR & Hybridization

90. Corrosion of iron (rusting) is fundamentally an?

- A. Acid-base reaction
 B. Electrochemical (redox) process
 C. Elimination reaction
 D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0091 / 1000

11. s- and p-Block Elements

91. According to VSEPR theory, CH₄ has what molecular geometry?

- A. Linear
 B. Trigonal planar
 C. Tetrahedral
 D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0092 / 1000

12. Transition Elements & Coordination

92. The molecular shape of NH₃ is trigonal pyramidal rather than tetrahedral because of?

- A. 3 lone pairs
 B. Repulsion from 1 lone pair on nitrogen
 C. 2 lone pairs
 D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to ~107°.

MCQ 0093 / 1000

13. Fundamental Organic Chemistry & Isomerism

93. Carbon atom in ethene (CH₂=CH₂) undergoes which type of hybridization?

- A. sp³
 B. sp²
 C. sp
 D. dsp²

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp² hybridization with 120° planar geometry.

MCQ 0094 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

94. A double covalent bond consists of?

- A. Two sigma bonds
 B. Two pi bonds
 C. One sigma and one pi bond
 D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0095 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

95. BF₃ molecule is nonpolar despite polar B-F bonds because its geometry is?

- A. Tetrahedral
 B. Trigonal planar
 C. Bent
 D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0096 / 1000

16. Alcohols & Phenols

96. A pi (π) bond is formed by?

- A. Head-on s-s overlap
 B. Sideways overlap of parallel p orbitals
 C. Head-on p-p overlap
 D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0097 / 1000

17. Aldehydes & Ketones

97. SF₆ central sulfur atom exhibits which hybridization and shape?

- A. sp³, Tetrahedral
 B. sp³d², Octahedral
 C. sp³d, Trigonal bipyramidal
 D. sp², Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp³d² octahedral.

MCQ 0098 / 1000

18. Carboxylic Acids & Derivatives

98. Bond energy generally increases as bond length?

- A. Increases
 B. Decreases
 C. Remains constant
 D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0099 / 1000

19. Macromolecules (Proteins & Enzymes)

99. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is?

- A. sp^3 B. sp^2
C. sp D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0100 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

100. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to?

- A. No lone pairs B. 1 lone pair
C. 2 lone pairs on oxygen D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0101 / 1000

1. Stoichiometry & Moles

101. The number of particles present in 1 mole of any substance is called? (Set 2)

- A. Faraday constant B. Gas constant
C. Avogadro constant D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0102 / 1000

2. Atomic Structure & Quantum Theory

102. One mole of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sucrose) has a molar mass of? (Set 2)

- A. 180 g B. 342 g
C. 360 g D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0103 / 1000

3. Gas Laws & Kinetic Molecular Theory

103. To identify the limiting reagent, available moles of each reactant are compared with? (Set 2)

- A. Boiling point B. Molar mass only
C. Physical state D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0104 / 1000

4. Liquids & Hydrogen Bonding

104. At STP, one mole of an ideal gas occupies a volume of? (Set 2)

- A. 11.2 dm^3 B. 44.8 dm^3
C. 24.0 dm^3 D. 22.4 dm^3

✓ **Correct Answer: D** 💡 **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm^3 .

MCQ 0105 / 1000

5. Solids & Lattice Energy

105. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 2)

- A. 90% B. 80%
C. 75% D. 95%

✓ **Correct Answer: A** 💡 **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0106 / 1000

6. Chemical Equilibrium & Le Chatelier

106. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 2)

- A. H_2 B. H_2O
C. O_2 D. Both equally

✓ **Correct Answer: C** 💡 **Concept / Tip:** 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0107 / 1000

7. Reaction Kinetics & Activation Energy

107. The maximum amount of product predicted by stoichiometric calculations is? (Set 2)

- A. Actual yield B. Percent yield
C. Theoretical yield D. Experimental yield

✓ **Correct Answer: C** 💡 **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0108 / 1000

8. Thermochemistry & Energetics

108. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 2)

- A. Boyle's law
C. Avogadro's law
B. Charles's law
D. Graham's law

✓ **Correct Answer: C** 💡 **Concept / Tip:** $V \propto n$ at constant T and P.

MCQ 0109 / 1000

9. Electrochemistry & Redox

109. For an ionic compound, the representative particle is best termed a? (Set 2)

- A. Molecule
C. Formula unit
B. Atom
D. Ion pair

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0110 / 1000

10. Chemical Bonding, VSEPR & Hybridization

110. Mass of 0.5 mole of water (H_2O) is? (Set 2)

- A. 9 g
C. 36 g
B. 18 g
D. 4.5 g

✓ **Correct Answer: A** 💡 **Concept / Tip:** $Mass = n \times M = 0.5 \times 18 = 9$ g.

MCQ 0111 / 1000

11. s- and p-Block Elements

111. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 2)

- A. 0, 1
C. 0, 1, 2, 3
B. 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D** 💡 **Concept / Tip:** l ranges from 0 to $(n - 1)$.

MCQ 0112 / 1000

12. Transition Elements & Coordination

112. The azimuthal quantum number (l) specifies the? (Set 2)

- A. Main energy level
C. Orientation of orbital
B. Shape of the subshell
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0113 / 1000

13. Fundamental Organic Chemistry & Isomerism

113. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 2)

- A. $[Ar] 3d^4 4s^2$
C. $[Ar] 3d^3 4s^3$
B. $[Ar] 3d^5 4s^1$
D. $[Ar] 3d^6 4s^0$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d^5 configuration imparts extra stability.

MCQ 0114 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

114. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 2)

- A. Infrared
C. Ultraviolet
B. Visible
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0115 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)

115. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 2)

- A. Parallel spins
C. Opposite spins
B. Same quantum numbers
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0116 / 1000

16. Alcohols & Phenols

116. The total number of orbitals present in the $n = 3$ shell is? (Set 2)

- A. 3
C. 9
B. 6
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0117 / 1000

17. Aldehydes & Ketones

117. Positive rays (canal rays) were discovered by? (Set 2)

- A. J.J. Thomson
 B. Eugen Goldstein
 C. James Chadwick
 D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0118 / 1000

18. Carboxylic Acids & Derivatives

118. Hund's rule states that degenerate orbitals are occupied? (Set 2)

- A. Randomly
 B. Paired immediately
 C. Singly first with parallel spins
 D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0119 / 1000

19. Macromolecules (Proteins & Enzymes)

119. An s orbital has what geometric shape? (Set 2)

- A. Dumbbell
 B. Double dumbbell
 C. Spherical
 D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0120 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

120. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 2)

- A. $n = 1$
 B. $n = 2$
 C. $n = 3$
 D. $n = 4$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0121 / 1000

1. Stoichiometry & Moles

121. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 2)

- A. Charles's law
 B. Boyle's law
 C. Avogadro's law
 D. Dalton's law

✓ **Correct Answer: B** 💡 **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0122 / 1000

2. Atomic Structure & Quantum Theory

122. Ideal gas behavior is best approached under which conditions? (Set 2)

- A. High P and Low T
 B. Low P and High T
 C. High P and High T
 D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0123 / 1000

3. Gas Laws & Kinetic Molecular Theory

123. The SI unit of the universal gas constant R is? (Set 2)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
 B. $\text{J K}^{-1} \text{ mol}^{-1}$
 C. $\text{cal K}^{-1} \text{ mol}^{-1}$
 D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0124 / 1000

4. Liquids & Hydrogen Bonding

124. Absolute zero corresponds to approximately? (Set 2)

- A. 0°C
 B. 100°C
 C. -273°C
 D. -100°C

✓ **Correct Answer: C** 💡 **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0125 / 1000

5. Solids & Lattice Energy

125. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 2)

- A. Temperature
 B. Pressure
 C. Molar mass or density
 D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1 / \sqrt{M}$.

6. Chemical Equilibrium & Le Chatelier

MCQ 0126 / 1000

126. Dalton's law applies to mixtures of gases that are? (Set 2)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

7. Reaction Kinetics & Activation Energy

MCQ 0127 / 1000

127. A gas occupies 3 dm³ at 150 K. At constant pressure, its volume at 300 K is? (Set 2)

- A. 1.5 dm³
B. 6 dm³
C. 9 dm³
D. 12 dm³

✓ **Correct Answer: B** 💡 **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

8. Thermochemistry & Energetics

MCQ 0128 / 1000

128. Real gases deviate from ideal gas behavior because real gas molecules? (Set 2)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

9. Electrochemistry & Redox

MCQ 0129 / 1000

129. Average kinetic energy of gas molecules is directly proportional to? (Set 2)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C** 💡 **Concept / Tip:** $KE_{avg} = (3/2) RT$.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0130 / 1000

130. Under school-level traditional STP, traditional temperature and pressure are? (Set 2)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

11. s- and p-Block Elements

MCQ 0131 / 1000

131. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 2)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

12. Transition Elements & Coordination

MCQ 0132 / 1000

132. A liquid boils when its vapor pressure becomes equal to? (Set 2)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{vap} = P_{ext}$.

13. Fundamental Organic Chemistry & Isomerism

MCQ 0133 / 1000

133. Evaporation is a cooling process because escaping surface molecules have? (Set 2)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

MCQ 0134 / 1000

134. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 2)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0135 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

135. Intermolecular forces in liquids are generally? (Set 2)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0136 / 1000

16. Alcohols & Phenols

136. Surface tension arises due to? (Set 2)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0137 / 1000

17. Aldehydes & Ketones

137. A volatile liquid generally possesses? (Set 2)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0138 / 1000

18. Carboxylic Acids & Derivatives

138. Viscosity of a liquid generally decreases as temperature? (Set 2)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0139 / 1000

19. Macromolecules (Proteins & Enzymes)

139. Which liquid exhibits the strongest hydrogen bonding? (Set 2)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0140 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

140. Capillary action of liquids is driven by the balance between? (Set 2)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0141 / 1000

1. Stoichiometry & Moles

141. A crystalline solid differs from an amorphous solid in possessing? (Set 2)

- A. Sharp melting point and long-range order
B. Gradual softening range
C. Isotropic properties only
D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0142 / 1000

2. Atomic Structure & Quantum Theory

142. Covalent network solids like diamond are characterized by? (Set 2)

- A. Low melting point
B. Extreme hardness and high melting point
C. High electrical conductivity as solid
D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0143 / 1000

3. Gas Laws & Kinetic Molecular Theory

143. Lattice energy is defined as energy released when? (Set 2)

- A. 1 mole of solid melts
B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water
D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0144 / 1000

4. Liquids & Hydrogen Bonding

144. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 2)

- A. Mg^{2+} and O^{2-} have higher ionic charges
 B. Na^+ is smaller than Mg^{2+}
 C. Cl^- is smaller than O^{2-}
 D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0145 / 1000

5. Solids & Lattice Energy

145. Ionic solids conduct electricity? (Set 2)

- A. In solid state only
 B. When molten or in aqueous solution
 C. Under no conditions
 D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0146 / 1000

6. Chemical Equilibrium & Le Chatelier

146. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 2)

- A. Atom
 B. Molecule
 C. Unit cell
 D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0147 / 1000

7. Reaction Kinetics & Activation Energy

147. Ionic crystals are brittle because shifting layers bring? (Set 2)

- A. Opposite charges together
 B. Like charges close together
 C. Electrons into nucleus
 D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0148 / 1000

8. Thermochemistry & Energetics

148. Molecular crystals like iodine (I_2) are held together by? (Set 2)

- A. Strong ionic bonds
 B. Metallic bonding
 C. Weak intermolecular forces (London forces)
 D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0149 / 1000

9. Electrochemistry & Redox

149. Anisotropy in crystalline solids means physical properties? (Set 2)

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0150 / 1000

10. Chemical Bonding, VSEPR & Hybridization

150. In NaCl crystal lattice, each Na^+ ion is surrounded octahedrally by how many Cl^- ions? (Set 2)

- A. 4
 B. 6
 C. 8
 D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0151 / 1000

11. s- and p-Block Elements

151. Dynamic equilibrium in a reversible reaction is achieved when? (Set 2)

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0152 / 1000

12. Transition Elements & Coordination

152. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 2)

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles ($3 \rightarrow 2$).

2. Atomic Structure & Quantum Theory

MCQ 0162 / 1000

162. A catalyst increases reaction rate primarily by? (Set 2)

- A. Increasing collision frequency only
 B. Lowering activation energy barrier
 C. Shifting equilibrium position
 D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

3. Gas Laws & Kinetic Molecular Theory

MCQ 0163 / 1000

163. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 2)

- A. Zero order
 B. First order
 C. Second order
 D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [A]^2 \rightarrow 2^2 = 4$, so order is 2.

4. Liquids & Hydrogen Bonding

MCQ 0164 / 1000

164. Activation energy (E_a) is best defined as? (Set 2)

- A. Energy difference between reactants and products
 B. Minimum energy required to form activated complex
 C. Total heat released
 D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

5. Solids & Lattice Energy

MCQ 0165 / 1000

165. A zero-order reaction has a rate that is? (Set 2)

- A. Directly proportional to concentration
 B. Independent of reactant concentration
 C. Proportional to square of concentration
 D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k [A]^0 = k$.

6. Chemical Equilibrium & Le Chatelier

MCQ 0166 / 1000

166. Increasing surface area of a solid reactant increases reaction rate because? (Set 2)

- A. It lowers activation energy
 B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant
 D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

7. Reaction Kinetics & Activation Energy

MCQ 0167 / 1000

167. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 2)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

8. Thermochemistry & Energetics

MCQ 0168 / 1000

168. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 2)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

9. Electrochemistry & Redox

MCQ 0169 / 1000

169. Increasing temperature increases reaction rate mainly by? (Set 2)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0170 / 1000

170. The activated complex (transition state) is? (Set 2)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

11. s- and p-Block Elements

A. Positive ΔH
C. Zero ΔH

B. Negative ΔH

D. Absorption of heat

✓ **Correct Answer: B** **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

12. Transition Elements & Coordination

A. Mass

C. Energy

B. Charge
D. Momentum

✓ **Correct Answer: C** **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

13. Fundamental Organic Chemistry & Isomerism

A. Always positive
C. Defined as zero

B. Always negative
D. 100 kJ/mol

✓ **Correct Answer: C** **Concept / Tip:** Pure elements in standard states serve as reference zero.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

A. The specific path taken
C. Rate of reaction

B. Initial and final states only

D. Catalyst used

✓ **Correct Answer: B** **Concept / Tip:** Path independent (e.g. U, H, T, P).

15. Alkyl Halides (SN1, SN2, E1, E2)

A. Internal energy change ΔU
C. Work done w

B. Enthalpy change ΔH
D. Equilibrium constant K

✓ Correct Answer: B Concept / Tip: $q_p = \Delta H$ under constant pressure.

16. Alcohols & Phenols

A. $\Delta U = q + w$
C. $PV = nRT$

B. $\Delta H = q - w$
D. $q = m c \Delta T$

✓ **Correct Answer: A** **Concept / Tip:** Internal energy change = heat added + work done on system.

17. Aldehydes & Ketones

A. Exothermic process
C. Isothermal process

B. Endothermic process
D. Energy-neutral process

✓ **Correct Answer: B** **Concept / Tip:** Energy input is required to cleave chemical bonds.

18. Carboxylic Acids & Derivatives

A. Exothermic

C. Spontaneous always

B. Endothermic
D. Adiabatic

✓ **Correct Answer: B** **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

19. Macromolecules (Proteins & Enzymes)

A. 100°C
C. 0.1 K

B. 1 K or 1°C

D. 10 K

✓ **Correct Answer: B** **Concept / Tip:** $C = q / \Delta T$.

MCQ 0180 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

180. In a bomb calorimeter, heat change is measured at constant? (Set 2)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0181 / 1000

1. Stoichiometry & Moles

181. In an electrochemical cell, oxidation always occurs at the? (Set 2)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0182 / 1000

2. Atomic Structure & Quantum Theory

182. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 2)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0183 / 1000

3. Gas Laws & Kinetic Molecular Theory

183. Reduction is defined as the? (Set 2)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0184 / 1000

4. Liquids & Hydrogen Bonding

184. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 2)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0185 / 1000

5. Solids & Lattice Energy

185. A salt bridge in a galvanic cell serves to? (Set 2)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0186 / 1000

6. Chemical Equilibrium & Le Chatelier

186. Standard cell EMF (E°_{cell}) is calculated as? (Set 2)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0187 / 1000

7. Reaction Kinetics & Activation Energy

187. A species with a highly negative standard reduction potential acts as a? (Set 2)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0188 / 1000

8. Thermochemistry & Energetics

188. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 2)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0189 / 1000

9. Electrochemistry & Redox

189. The oxidation number of sulfur in H_2SO_4 is? (Set 2)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0190 / 1000

10. Chemical Bonding, VSEPR & Hybridization

190. Corrosion of iron (rusting) is fundamentally an? (Set 2)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0191 / 1000

11. s- and p-Block Elements

191. According to VSEPR theory, CH_4 has what molecular geometry? (Set 2)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0192 / 1000

12. Transition Elements & Coordination

192. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 2)

- A. 3 lone pairs
B. Repulsion from 1 lone pair on nitrogen
C. 2 lone pairs
D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0193 / 1000

13. Fundamental Organic Chemistry & Isomerism

193. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 2)

- A. sp^3
B. sp^2
C. sp
D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0194 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

194. A double covalent bond consists of? (Set 2)

- A. Two sigma bonds
B. Two pi bonds
C. One sigma and one pi bond
D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0195 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)**195. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 2)**

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0196 / 1000

16. Alcohols & Phenols

196. A pi (π) bond is formed by? (Set 2)

- A. Head-on s-s overlap
B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap
D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0197 / 1000

17. Aldehydes & Ketones

197. SF_6 central sulfur atom exhibits which hybridization and shape? (Set 2)

- A. sp^3 , Tetrahedral
B. sp^3d^2 , Octahedral
C. sp^3d , Trigonal bipyramidal
D. sp^2 , Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp^3d^2 octahedral.

MCQ 0198 / 1000

18. Carboxylic Acids & Derivatives

198. Bond energy generally increases as bond length? (Set 2)

- A. Increases
B. Decreases
C. Remains constant
D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0199 / 1000

19. Macromolecules (Proteins & Enzymes)

199. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 2)

- A. sp^3
B. sp^2
C. sp
D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0200 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

200. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 2)

- A. No lone pairs
B. 1 lone pair
C. 2 lone pairs on oxygen
D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0201 / 1000

1. Stoichiometry & Moles

201. The number of particles present in 1 mole of any substance is called? (Set 3)

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0202 / 1000

2. Atomic Structure & Quantum Theory

202. One mole of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sucrose) has a molar mass of? (Set 3)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0203 / 1000

3. Gas Laws & Kinetic Molecular Theory

203. To identify the limiting reagent, available moles of each reactant are compared with? (Set 3)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0204 / 1000

4. Liquids & Hydrogen Bonding

204. At STP, one mole of an ideal gas occupies a volume of? (Set 3)

- A. 11.2 dm^3
B. 44.8 dm^3
C. 24.0 dm^3
D. 22.4 dm^3

✓ **Correct Answer: D** 💡 **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm^3 .

MCQ 0205 / 1000

5. Solids & Lattice Energy

205. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 3)

- A. 90%
B. 80%
C. 75%
D. 95%

✓ **Correct Answer: A** 💡 **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0206 / 1000

6. Chemical Equilibrium & Le Chatelier

206. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 3)

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ **Correct Answer: C** 💡 **Concept / Tip:** 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0207 / 1000

7. Reaction Kinetics & Activation Energy

207. The maximum amount of product predicted by stoichiometric calculations is? (Set 3)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ **Correct Answer: C** 💡 **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0208 / 1000

8. Thermochemistry & Energetics

208. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 3)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ **Correct Answer: C** 💡 **Concept / Tip:** $V \propto n$ at constant T and P.

MCQ 0209 / 1000

9. Electrochemistry & Redox

209. For an ionic compound, the representative particle is best termed a? (Set 3)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0210 / 1000

10. Chemical Bonding, VSEPR & Hybridization

210. Mass of 0.5 mole of water (H_2O) is? (Set 3)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A** 💡 **Concept / Tip:** Mass = $n \times M = 0.5 \times 18 = 9$ g.

MCQ 0211 / 1000

11. s- and p-Block Elements

211. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 3)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D** 💡 **Concept / Tip:** l ranges from 0 to $(n - 1)$.

MCQ 0212 / 1000

12. Transition Elements & Coordination

212. The azimuthal quantum number (l) specifies the? (Set 3)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0213 / 1000

13. Fundamental Organic Chemistry & Isomerism

213. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 3)

- A. $[Ar] 3d^4 4s^2$
B. $[Ar] 3d^5 4s^1$
C. $[Ar] 3d^3 4s^3$
D. $[Ar] 3d^6 4s^0$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d^5 configuration imparts extra stability.

MCQ 0214 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

214. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 3)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0215 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)**215. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 3)**

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0216 / 1000

16. Alcohols & Phenols

216. The total number of orbitals present in the $n = 3$ shell is? (Set 3)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C**  **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0217 / 1000

17. Aldehydes & Ketones

217. Positive rays (canal rays) were discovered by? (Set 3)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B**  **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0218 / 1000

18. Carboxylic Acids & Derivatives

218. Hund's rule states that degenerate orbitals are occupied? (Set 3)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C**  **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0219 / 1000

19. Macromolecules (Proteins & Enzymes)

219. An s orbital has what geometric shape? (Set 3)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C**  **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0220 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

220. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 3)

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B**  **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0221 / 1000

1. Stoichiometry & Moles

221. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 3)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B**  **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0222 / 1000

2. Atomic Structure & Quantum Theory

222. Ideal gas behavior is best approached under which conditions? (Set 3)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B**  **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0223 / 1000

3. Gas Laws & Kinetic Molecular Theory

223. The SI unit of the universal gas constant R is? (Set 3)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B**  **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0224 / 1000

4. Liquids & Hydrogen Bonding

224. Absolute zero corresponds to approximately? (Set 3)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C**  **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0225 / 1000

5. Solids & Lattice Energy

225. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 3)

- A. Temperature
C. Molar mass or density
- B. Pressure
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1/\sqrt{M}$.

MCQ 0226 / 1000

6. Chemical Equilibrium & Le Chatelier

226. Dalton's law applies to mixtures of gases that are? (Set 3)

- A. Reacting strongly
C. Polar only
- B. Non-reacting
D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

MCQ 0227 / 1000

7. Reaction Kinetics & Activation Energy

227. A gas occupies 3 dm³ at 150 K. At constant pressure, its volume at 300 K is? (Set 3)

- A. 1.5 dm³
C. 9 dm³
- B. 6 dm³
D. 12 dm³

✓ **Correct Answer: B** 💡 **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

MCQ 0228 / 1000

8. Thermochemistry & Energetics

228. Real gases deviate from ideal gas behavior because real gas molecules? (Set 3)

- A. Have no mass
C. Do not collide
- B. Have finite volume and attractions
D. Have zero kinetic energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0229 / 1000

9. Electrochemistry & Redox

229. Average kinetic energy of gas molecules is directly proportional to? (Set 3)

- A. Volume
C. Absolute temperature
- B. Pressure
D. Molar mass

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{KE}_{\text{avg}} = (3/2) RT$.

MCQ 0230 / 1000

10. Chemical Bonding, VSEPR & Hybridization

230. Under school-level traditional STP, traditional temperature and pressure are? (Set 3)

- A. 298 K, 1 atm
C. 0 K, 1 atm
- B. 273 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0231 / 1000

11. s- and p-Block Elements

231. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 3)

- A. Ionic bonding
C. Open hydrogen-bonded structure
- B. Covalent bonding
D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0232 / 1000

12. Transition Elements & Coordination

232. A liquid boils when its vapor pressure becomes equal to? (Set 3)

- A. Internal pressure
C. Zero pressure
- B. External atmospheric pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{\text{vap}} = P_{\text{ext}}$.

MCQ 0233 / 1000

13. Fundamental Organic Chemistry & Isomerism

233. Evaporation is a cooling process because escaping surface molecules have? (Set 3)

- A. Lowest kinetic energy
C. Zero energy
- B. Highest kinetic energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0234 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

234. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 3)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0235 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

235. Intermolecular forces in liquids are generally? (Set 3)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0236 / 1000

16. Alcohols & Phenols

236. Surface tension arises due to? (Set 3)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0237 / 1000

17. Aldehydes & Ketones

237. A volatile liquid generally possesses? (Set 3)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0238 / 1000

18. Carboxylic Acids & Derivatives

238. Viscosity of a liquid generally decreases as temperature? (Set 3)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0239 / 1000

19. Macromolecules (Proteins & Enzymes)

239. Which liquid exhibits the strongest hydrogen bonding? (Set 3)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0240 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

240. Capillary action of liquids is driven by the balance between? (Set 3)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0241 / 1000

1. Stoichiometry & Moles

241. A crystalline solid differs from an amorphous solid in possessing? (Set 3)

- A. Sharp melting point and long-range order
B. Gradual softening range
C. Isotropic properties only
D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0242 / 1000

2. Atomic Structure & Quantum Theory

242. Covalent network solids like diamond are characterized by? (Set 3)

- A. Low melting point
B. Extreme hardness and high melting point
C. High electrical conductivity as solid
D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0243 / 1000

3. Gas Laws & Kinetic Molecular Theory

243. Lattice energy is defined as energy released when? (Set 3)

- A. 1 mole of solid melts
B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water
D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0244 / 1000

4. Liquids & Hydrogen Bonding

244. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 3)

- A. Mg^{2+} and O^{2-} have higher ionic charges
B. Na^+ is smaller than Mg^{2+}
C. Cl^- is smaller than O^{2-}
D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0245 / 1000

5. Solids & Lattice Energy

245. Ionic solids conduct electricity? (Set 3)

- A. In solid state only
B. When molten or in aqueous solution
C. Under no conditions
D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0246 / 1000

6. Chemical Equilibrium & Le Chatelier

246. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 3)

- A. Atom
B. Molecule
C. Unit cell
D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0247 / 1000

7. Reaction Kinetics & Activation Energy

247. Ionic crystals are brittle because shifting layers bring? (Set 3)

- A. Opposite charges together
B. Like charges close together
C. Electrons into nucleus
D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0248 / 1000

8. Thermochemistry & Energetics

248. Molecular crystals like iodine (I_2) are held together by? (Set 3)

- A. Strong ionic bonds
B. Metallic bonding
C. Weak intermolecular forces (London forces)
D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0249 / 1000

9. Electrochemistry & Redox

249. Anisotropy in crystalline solids means physical properties? (Set 3)

- A. Are identical in all directions
B. Vary depending on directional orientation
C. Are zero in all directions
D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0250 / 1000

10. Chemical Bonding, VSEPR & Hybridization

250. In NaCl crystal lattice, each Na^+ ion is surrounded octahedrally by how many Cl^- ions? (Set 3)

- A. 4
B. 6
C. 8
D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0251 / 1000

11. s- and p-Block Elements

251. Dynamic equilibrium in a reversible reaction is achieved when? (Set 3)

- A. Forward reaction stops
B. Forward and reverse reaction rates become equal
C. Concentrations of reactants reach zero
D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0252 / 1000

12. Transition Elements & Coordination

252. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 3)

- A. Reactants
B. Products
C. Neither side
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

MCQ 0253 / 1000

13. Fundamental Organic Chemistry & Isomerism

253. Adding a catalyst to a reaction at equilibrium? (Set 3)

- A. Increases K_c
B. Shifts position to products
C. Speeds up attainment of equilibrium without shifting position
D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0254 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

254. An acidic buffer solution can be prepared by mixing? (Set 3)

- A. Strong acid and strong base
B. Weak acid and its conjugate base salt
C. Weak base and strong base
D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0255 / 1000

15. Alkyl Halides ($\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$, $\text{E}1$, $\text{E}2$)**255. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 3)**

- A. $[\text{M}^{2+}][\text{X}^-]$
B. $[\text{M}^{2+}][\text{X}^-]^2$
C. $[\text{M}^{2+}]^2[\text{X}^-]$
D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{\text{sp}} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0256 / 1000

16. Alcohols & Phenols

256. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 3)

- A. Increase
B. Decrease
C. Remain unchanged
D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0257 / 1000

17. Aldehydes & Ketones

257. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 3)

- A. Products
B. Reactants
C. No shift
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0258 / 1000

18. Carboxylic Acids & Derivatives

258. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 3)

- A. Pressure
B. Concentration
C. Temperature
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0259 / 1000

19. Macromolecules (Proteins & Enzymes)

259. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 3)

- A. Only acid
B. Only base
C. Both acid and base
D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0260 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

260. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 3)

- A. Low pressure and high T
B. High pressure and low T
C. Low pressure and low T
D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0261 / 1000

1. Stoichiometry & Moles

261. The unit of rate constant (k) for a first-order reaction is? (Set 3)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$ B. s^{-1}
 C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$ D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[A] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0262 / 1000

2. Atomic Structure & Quantum Theory

262. A catalyst increases reaction rate primarily by? (Set 3)

- A. Increasing collision frequency only B. Lowering activation energy barrier
 C. Shifting equilibrium position D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0263 / 1000

3. Gas Laws & Kinetic Molecular Theory

263. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 3)

- A. Zero order B. First order
 C. Second order D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [A]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0264 / 1000

4. Liquids & Hydrogen Bonding

264. Activation energy (E_a) is best defined as? (Set 3)

- A. Energy difference between reactants and products B. Minimum energy required to form activated complex
 C. Total heat released D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0265 / 1000

5. Solids & Lattice Energy

265. A zero-order reaction has a rate that is? (Set 3)

- A. Directly proportional to concentration B. Independent of reactant concentration
 C. Proportional to square of concentration D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[A]^0 = k$.

MCQ 0266 / 1000

6. Chemical Equilibrium & Le Chatelier

266. Increasing surface area of a solid reactant increases reaction rate because? (Set 3)

- A. It lowers activation energy B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0267 / 1000

7. Reaction Kinetics & Activation Energy

267. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 3)

- A. Directly proportional to initial concentration B. Inversely proportional to initial concentration
 C. Independent of initial concentration D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0268 / 1000

8. Thermochemistry & Energetics

268. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 3)

- A. Fast step B. Rate-determining step
 C. Equilibrium step D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0269 / 1000

9. Electrochemistry & Redox

269. Increasing temperature increases reaction rate mainly by? (Set 3)

- A. Decreasing reactant mass B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0270 / 1000

10. Chemical Bonding, VSEPR & Hybridization

270. The activated complex (transition state) is? (Set 3)

- A. A stable intermediate
B. A high-energy, unstable temporary arrangement
C. The final product
D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0271 / 1000

11. s- and p-Block Elements

271. An exothermic reaction is characterized by? (Set 3)

- A. Positive ΔH
B. Negative ΔH
C. Zero ΔH
D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0272 / 1000

12. Transition Elements & Coordination

272. Hess's law of constant heat summation is a direct application of conservation of? (Set 3)

- A. Mass
B. Charge
C. Energy
D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0273 / 1000

13. Fundamental Organic Chemistry & Isomerism

273. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 3)

- A. Always positive
B. Always negative
C. Defined as zero
D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0274 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

274. A state function depends on? (Set 3)

- A. The specific path taken
B. Initial and final states only
C. Rate of reaction
D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0275 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

275. At constant pressure, the heat change accompanying a reaction equals? (Set 3)

- A. Internal energy change ΔU
B. Enthalpy change ΔH
C. Work done w
D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0276 / 1000

16. Alcohols & Phenols

276. The first law of thermodynamics is expressed mathematically as? (Set 3)

- A. $\Delta U = q + w$
B. $\Delta H = q - w$
C. $PV = nRT$
D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0277 / 1000

17. Aldehydes & Ketones

277. Bond breaking is always an? (Set 3)

- A. Exothermic process
B. Endothermic process
C. Isothermal process
D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0278 / 1000

18. Carboxylic Acids & Derivatives

278. A reaction that absorbs heat from surroundings is described as? (Set 3)

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0279 / 1000

19. Macromolecules (Proteins & Enzymes)

279. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 3)

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0280 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

280. In a bomb calorimeter, heat change is measured at constant? (Set 3)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0281 / 1000

1. Stoichiometry & Moles

281. In an electrochemical cell, oxidation always occurs at the? (Set 3)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0282 / 1000

2. Atomic Structure & Quantum Theory

282. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 3)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0283 / 1000

3. Gas Laws & Kinetic Molecular Theory

283. Reduction is defined as the? (Set 3)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0284 / 1000

4. Liquids & Hydrogen Bonding

284. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 3)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0285 / 1000

5. Solids & Lattice Energy

285. A salt bridge in a galvanic cell serves to? (Set 3)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0286 / 1000

6. Chemical Equilibrium & Le Chatelier

286. Standard cell EMF (E°_{cell}) is calculated as? (Set 3)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0287 / 1000

7. Reaction Kinetics & Activation Energy

287. A species with a highly negative standard reduction potential acts as a? (Set 3)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0288 / 1000

8. Thermochemistry & Energetics

288. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 3)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0289 / 1000

9. Electrochemistry & Redox

289. The oxidation number of sulfur in H_2SO_4 is? (Set 3)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0290 / 1000

10. Chemical Bonding, VSEPR & Hybridization

290. Corrosion of iron (rusting) is fundamentally an? (Set 3)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0291 / 1000

11. s- and p-Block Elements

291. According to VSEPR theory, CH_4 has what molecular geometry? (Set 3)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0292 / 1000

12. Transition Elements & Coordination

292. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 3)

- A. 3 lone pairs
B. Repulsion from 1 lone pair on nitrogen
C. 2 lone pairs
D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0293 / 1000

13. Fundamental Organic Chemistry & Isomerism

293. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 3)

- A. sp^3
B. sp^2
C. sp
D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0294 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

294. A double covalent bond consists of? (Set 3)

- A. Two sigma bonds
B. Two pi bonds
C. One sigma and one pi bond
D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0295 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)**295. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 3)**

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0296 / 1000

16. Alcohols & Phenols

296. A pi (π) bond is formed by? (Set 3)

- A. Head-on s-s overlap
B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap
D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0297 / 1000

17. Aldehydes & Ketones

297. SF₆ central sulfur atom exhibits which hybridization and shape? (Set 3)

- A. sp³, Tetrahedral
 B. sp³d², Octahedral
 C. sp³d, Trigonal bipyramidal
 D. sp², Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp³d² octahedral.

MCQ 0298 / 1000

18. Carboxylic Acids & Derivatives

298. Bond energy generally increases as bond length? (Set 3)

- A. Increases
 B. Decreases
 C. Remains constant
 D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0299 / 1000

19. Macromolecules (Proteins & Enzymes)

299. Hybridization of central carbon in ethyne (HC≡CH) is? (Set 3)

- A. sp³
 B. sp²
 C. sp
 D. dsp²

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0300 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

300. The molecule H₂O has a bent shape with a bond angle of ~104.5° due to? (Set 3)

- A. No lone pairs
 B. 1 lone pair
 C. 2 lone pairs on oxygen
 D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0301 / 1000

1. Stoichiometry & Moles

301. The number of particles present in 1 mole of any substance is called? (Set 4)

- A. Faraday constant
 B. Gas constant
 C. Avogadro constant
 D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0302 / 1000

2. Atomic Structure & Quantum Theory

302. One mole of C₁₂H₂₂O₁₁ (sucrose) has a molar mass of? (Set 4)

- A. 180 g
 B. 342 g
 C. 360 g
 D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342$ g/mol.

MCQ 0303 / 1000

3. Gas Laws & Kinetic Molecular Theory

303. To identify the limiting reagent, available moles of each reactant are compared with? (Set 4)

- A. Boiling point
 B. Molar mass only
 C. Physical state
 D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0304 / 1000

4. Liquids & Hydrogen Bonding

304. At STP, one mole of an ideal gas occupies a volume of? (Set 4)

- A. 11.2 dm³
 B. 44.8 dm³
 C. 24.0 dm³
 D. 22.4 dm³

✓ **Correct Answer: D** 💡 **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm³.

MCQ 0305 / 1000

5. Solids & Lattice Energy

305. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 4)

- A. 90%
 B. 80%
 C. 75%
 D. 95%

✓ **Correct Answer: A** 💡 **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

6. Chemical Equilibrium & Le Chatelier

306. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 4)

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ **Correct Answer: C**  **Concept / Tip:** 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

7. Reaction Kinetics & Activation Energy

307. The maximum amount of product predicted by stoichiometric calculations is? (Set 4)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ **Correct Answer: C** **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

8. Thermochemistry & Energetics

308. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 4)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ Correct Answer: C Concept / Tip: $V \propto n$ at constant T and P.

9. Electrochemistry & Redox

309. For an ionic compound, the representative particle is best termed a? (Set 4)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C** **Concept / Tip:** Ionic lattices are described by formula units.

10. Chemical Bonding, VSEPR & Hybridization

310. Mass of 0.5 mole of water (H_2O) is? (Set 4)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A** **Concept / Tip:** Mass = $n \times M = 0.5 \times 18 = 9$ g.

11. s- and p-Block Elements

311. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 4)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D**  **Concept / Tip:** l ranges from 0 to $(n - 1)$.

12. Transition Elements & Coordination

312. The azimuthal quantum number (l) specifies the? (Set 4)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B**  **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

13. Fundamental Organic Chemistry & Isomerism

313. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 4)

- A. [Ar] 3d⁴ 4s²
B. [Ar] 3d⁵ 4s¹
C. [Ar] 3d³ 4s³
D. [Ar] 3d⁶ 4s⁰

✓ **Correct Answer: B** **Concept / Tip:** Half-filled d^5 configuration imparts extra stability.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

314. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 4)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0315 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

315. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 4)

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0316 / 1000

16. Alcohols & Phenols

316. The total number of orbitals present in the $n = 3$ shell is? (Set 4)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0317 / 1000

17. Aldehydes & Ketones

317. Positive rays (canal rays) were discovered by? (Set 4)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0318 / 1000

18. Carboxylic Acids & Derivatives

318. Hund's rule states that degenerate orbitals are occupied? (Set 4)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0319 / 1000

19. Macromolecules (Proteins & Enzymes)

319. An s orbital has what geometric shape? (Set 4)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0320 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

320. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 4)

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0321 / 1000

1. Stoichiometry & Moles

321. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 4)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B** 💡 **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0322 / 1000

2. Atomic Structure & Quantum Theory

322. Ideal gas behavior is best approached under which conditions? (Set 4)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0323 / 1000

3. Gas Laws & Kinetic Molecular Theory

323. The SI unit of the universal gas constant R is? (Set 4)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0324 / 1000

4. Liquids & Hydrogen Bonding

324. Absolute zero corresponds to approximately? (Set 4)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C**  **Concept / Tip:** Absolute zero is 0 K or -273.15°C.

MCQ 0325 / 1000

5. Solids & Lattice Energy

325. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 4)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C**  **Concept / Tip:** Rate $\propto 1/\sqrt{M}$.

MCQ 0326 / 1000

6. Chemical Equilibrium & Le Chatelier

326. Dalton's law applies to mixtures of gases that are? (Set 4)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B**  **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

MCQ 0327 / 1000

7. Reaction Kinetics & Activation Energy

327. A gas occupies 3 dm³ at 150 K. At constant pressure, its volume at 300 K is? (Set 4)

- A. 1.5 dm³
B. 6 dm³
C. 9 dm³
D. 12 dm³

✓ **Correct Answer: B**  **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

MCQ 0328 / 1000

8. Thermochemistry & Energetics

328. Real gases deviate from ideal gas behavior because real gas molecules? (Set 4)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B**  **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0329 / 1000

9. Electrochemistry & Redox

329. Average kinetic energy of gas molecules is directly proportional to? (Set 4)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C**  **Concept / Tip:** $KE_{avg} = (3/2) RT$.

MCQ 0330 / 1000

10. Chemical Bonding, VSEPR & Hybridization

330. Under school-level traditional STP, traditional temperature and pressure are? (Set 4)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B**  **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0331 / 1000

11. s- and p-Block Elements

331. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 4)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C**  **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0332 / 1000

12. Transition Elements & Coordination

332. A liquid boils when its vapor pressure becomes equal to? (Set 4)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B**  **Concept / Tip:** Boiling occurs throughout the liquid when $P_{vap} = P_{ext}$.

MCQ 0333 / 1000

13. Fundamental Organic Chemistry & Isomerism

333. Evaporation is a cooling process because escaping surface molecules have? (Set 4)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0334 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

334. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 4)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0335 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

335. Intermolecular forces in liquids are generally? (Set 4)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0336 / 1000

16. Alcohols & Phenols

336. Surface tension arises due to? (Set 4)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0337 / 1000

17. Aldehydes & Ketones

337. A volatile liquid generally possesses? (Set 4)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0338 / 1000

18. Carboxylic Acids & Derivatives

338. Viscosity of a liquid generally decreases as temperature? (Set 4)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0339 / 1000

19. Macromolecules (Proteins & Enzymes)

339. Which liquid exhibits the strongest hydrogen bonding? (Set 4)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0340 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

340. Capillary action of liquids is driven by the balance between? (Set 4)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0341 / 1000

1. Stoichiometry & Moles

341. A crystalline solid differs from an amorphous solid in possessing? (Set 4)

- A. Sharp melting point and long-range order
B. Gradual softening range
C. Isotropic properties only
D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0342 / 1000

2. Atomic Structure & Quantum Theory

342. Covalent network solids like diamond are characterized by? (Set 4)

- A. Low melting point
B. Extreme hardness and high melting point
C. High electrical conductivity as solid
D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0343 / 1000

3. Gas Laws & Kinetic Molecular Theory

343. Lattice energy is defined as energy released when? (Set 4)

- A. 1 mole of solid melts
B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water
D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0344 / 1000

4. Liquids & Hydrogen Bonding

344. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 4)

- A. Mg^{2+} and O^{2-} have higher ionic charges
B. Na^+ is smaller than Mg^{2+}
C. Cl^- is smaller than O^{2-}
D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0345 / 1000

5. Solids & Lattice Energy

345. Ionic solids conduct electricity? (Set 4)

- A. In solid state only
B. When molten or in aqueous solution
C. Under no conditions
D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0346 / 1000

6. Chemical Equilibrium & Le Chatelier

346. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 4)

- A. Atom
B. Molecule
C. Unit cell
D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0347 / 1000

7. Reaction Kinetics & Activation Energy

347. Ionic crystals are brittle because shifting layers bring? (Set 4)

- A. Opposite charges together
B. Like charges close together
C. Electrons into nucleus
D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0348 / 1000

8. Thermochemistry & Energetics

348. Molecular crystals like iodine (I_2) are held together by? (Set 4)

- A. Strong ionic bonds
B. Metallic bonding
C. Weak intermolecular forces (London forces)
D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0349 / 1000

9. Electrochemistry & Redox

349. Anisotropy in crystalline solids means physical properties? (Set 4)

- A. Are identical in all directions
B. Vary depending on directional orientation
C. Are zero in all directions
D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0350 / 1000

10. Chemical Bonding, VSEPR & Hybridization

350. In NaCl crystal lattice, each Na^+ ion is surrounded octahedrally by how many Cl^- ions? (Set 4)

- A. 4
B. 6
C. 8
D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0351 / 1000

11. s- and p-Block Elements

351. Dynamic equilibrium in a reversible reaction is achieved when? (Set 4)

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0352 / 1000

12. Transition Elements & Coordination

352. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 4)

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles ($3 \rightarrow 2$).

MCQ 0353 / 1000

13. Fundamental Organic Chemistry & Isomerism

353. Adding a catalyst to a reaction at equilibrium? (Set 4)

- A. Increases K_c
 B. Shifts position to products
 C. Speeds up attainment of equilibrium without shifting position
 D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0354 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

354. An acidic buffer solution can be prepared by mixing? (Set 4)

- A. Strong acid and strong base
 B. Weak acid and its conjugate base salt
 C. Weak base and strong base
 D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0355 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

355. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 4)

- A. $[\text{M}^{2+}][\text{X}^-]$
 B. $[\text{M}^{2+}][\text{X}^-]^2$
 C. $[\text{M}^{2+}]^2[\text{X}^-]$
 D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{sp} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0356 / 1000

16. Alcohols & Phenols

356. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 4)

- A. Increase
 B. Decrease
 C. Remain unchanged
 D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0357 / 1000

17. Aldehydes & Ketones

357. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 4)

- A. Products
 B. Reactants
 C. No shift
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0358 / 1000

18. Carboxylic Acids & Derivatives

358. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 4)

- A. Pressure
 B. Concentration
 C. Temperature
 D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0359 / 1000

19. Macromolecules (Proteins & Enzymes)

359. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 4)

- A. Only acid
 B. Only base
 C. Both acid and base
 D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0360 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

360. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 4)

- A. Low pressure and high T
 B. High pressure and low T
 C. Low pressure and low T
 D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0361 / 1000

1. Stoichiometry & Moles

361. The unit of rate constant (k) for a first-order reaction is? (Set 4)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
 B. s^{-1}
 C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
 D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0362 / 1000

2. Atomic Structure & Quantum Theory

362. A catalyst increases reaction rate primarily by? (Set 4)

- A. Increasing collision frequency only
 B. Lowering activation energy barrier
 C. Shifting equilibrium position
 D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0363 / 1000

3. Gas Laws & Kinetic Molecular Theory

363. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 4)

- A. Zero order
 B. First order
 C. Second order
 D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0364 / 1000

4. Liquids & Hydrogen Bonding

364. Activation energy (E_a) is best defined as? (Set 4)

- A. Energy difference between reactants and products
 B. Minimum energy required to form activated complex
 C. Total heat released
 D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0365 / 1000

5. Solids & Lattice Energy

365. A zero-order reaction has a rate that is? (Set 4)

- A. Directly proportional to concentration
 B. Independent of reactant concentration
 C. Proportional to square of concentration
 D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}]^0 = k$.

MCQ 0366 / 1000

6. Chemical Equilibrium & Le Chatelier

366. Increasing surface area of a solid reactant increases reaction rate because? (Set 4)

- A. It lowers activation energy
 B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant
 D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0367 / 1000

7. Reaction Kinetics & Activation Energy

367. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 4)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0368 / 1000

8. Thermochemistry & Energetics

368. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 4)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0369 / 1000

9. Electrochemistry & Redox

369. Increasing temperature increases reaction rate mainly by? (Set 4)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0370 / 1000

10. Chemical Bonding, VSEPR & Hybridization

370. The activated complex (transition state) is? (Set 4)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0371 / 1000

11. s- and p-Block Elements

371. An exothermic reaction is characterized by? (Set 4)

- A. Positive ΔH
 B. Negative ΔH
 C. Zero ΔH
 D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0372 / 1000

12. Transition Elements & Coordination

372. Hess's law of constant heat summation is a direct application of conservation of? (Set 4)

- A. Mass
 B. Charge
 C. Energy
 D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0373 / 1000

13. Fundamental Organic Chemistry & Isomerism

373. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 4)

- A. Always positive
 B. Always negative
 C. Defined as zero
 D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0374 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

374. A state function depends on? (Set 4)

- A. The specific path taken
 B. Initial and final states only
 C. Rate of reaction
 D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0375 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

375. At constant pressure, the heat change accompanying a reaction equals? (Set 4)

- A. Internal energy change ΔU
 B. Enthalpy change ΔH
 C. Work done w
 D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0376 / 1000

16. Alcohols & Phenols

376. The first law of thermodynamics is expressed mathematically as? (Set 4)

- A. $\Delta U = q + w$
 B. $\Delta H = q - w$
 C. $PV = nRT$
 D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0377 / 1000

17. Aldehydes & Ketones

377. Bond breaking is always an? (Set 4)

- A. Exothermic process
 B. Endothermic process
 C. Isothermal process
 D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

18. Carboxylic Acids & Derivatives

MCQ 0378 / 1000

378. A reaction that absorbs heat from surroundings is described as? (Set 4)

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

19. Macromolecules (Proteins & Enzymes)

MCQ 0379 / 1000

379. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 4)

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

MCQ 0380 / 1000

380. In a bomb calorimeter, heat change is measured at constant? (Set 4)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

1. Stoichiometry & Moles

MCQ 0381 / 1000

381. In an electrochemical cell, oxidation always occurs at the? (Set 4)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

2. Atomic Structure & Quantum Theory

MCQ 0382 / 1000

382. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 4)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

3. Gas Laws & Kinetic Molecular Theory

MCQ 0383 / 1000

383. Reduction is defined as the? (Set 4)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

4. Liquids & Hydrogen Bonding

MCQ 0384 / 1000

384. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 4)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

5. Solids & Lattice Energy

MCQ 0385 / 1000

385. A salt bridge in a galvanic cell serves to? (Set 4)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

6. Chemical Equilibrium & Le Chatelier

MCQ 0386 / 1000

386. Standard cell EMF (E°_{cell}) is calculated as? (Set 4)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0387 / 1000

7. Reaction Kinetics & Activation Energy

387. A species with a highly negative standard reduction potential acts as a? (Set 4)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0388 / 1000

8. Thermochemistry & Energetics

388. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 4)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0389 / 1000

9. Electrochemistry & Redox

389. The oxidation number of sulfur in H_2SO_4 is? (Set 4)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0390 / 1000

10. Chemical Bonding, VSEPR & Hybridization

390. Corrosion of iron (rusting) is fundamentally an? (Set 4)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0391 / 1000

11. s- and p-Block Elements

391. According to VSEPR theory, CH_4 has what molecular geometry? (Set 4)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0392 / 1000

12. Transition Elements & Coordination

392. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 4)

- A. 3 lone pairs
B. Repulsion from 1 lone pair on nitrogen
C. 2 lone pairs
D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0393 / 1000

13. Fundamental Organic Chemistry & Isomerism

393. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 4)

- A. sp^3
B. sp^2
C. sp
D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0394 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

394. A double covalent bond consists of? (Set 4)

- A. Two sigma bonds
B. Two pi bonds
C. One sigma and one pi bond
D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0395 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E1, E2)**395. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 4)**

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0396 / 1000

16. Alcohols & Phenols

396. A pi (π) bond is formed by? (Set 4)

- A. Head-on s-s overlap
 B. Sideways overlap of parallel p orbitals
 C. Head-on p-p overlap
 D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0397 / 1000

17. Aldehydes & Ketones

397. SF_6 central sulfur atom exhibits which hybridization and shape? (Set 4)

- A. sp^3 , Tetrahedral
 B. sp^3d^2 , Octahedral
 C. sp^3d , Trigonal bipyramidal
 D. sp^2 , Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp^3d^2 octahedral.

MCQ 0398 / 1000

18. Carboxylic Acids & Derivatives

398. Bond energy generally increases as bond length? (Set 4)

- A. Increases
 B. Decreases
 C. Remains constant
 D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0399 / 1000

19. Macromolecules (Proteins & Enzymes)

399. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 4)

- A. sp^3
 B. sp^2
 C. sp
 D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0400 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

400. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 4)

- A. No lone pairs
 B. 1 lone pair
 C. 2 lone pairs on oxygen
 D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0401 / 1000

1. Stoichiometry & Moles

401. The number of particles present in 1 mole of any substance is called? (Set 5)

- A. Faraday constant
 B. Gas constant
 C. Avogadro constant
 D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0402 / 1000

2. Atomic Structure & Quantum Theory

402. One mole of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sucrose) has a molar mass of? (Set 5)

- A. 180 g
 B. 342 g
 C. 360 g
 D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0403 / 1000

3. Gas Laws & Kinetic Molecular Theory

403. To identify the limiting reagent, available moles of each reactant are compared with? (Set 5)

- A. Boiling point
 B. Molar mass only
 C. Physical state
 D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0404 / 1000

4. Liquids & Hydrogen Bonding

404. At STP, one mole of an ideal gas occupies a volume of? (Set 5)

- A. 11.2 dm^3
 B. 44.8 dm^3
 C. 24.0 dm^3
 D. 22.4 dm^3

✓ **Correct Answer: D** 💡 **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm^3 .

MCQ 0405 / 1000

5. Solids & Lattice Energy

405. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 5)

- A. 90% B. 80%
C. 75% D. 95%

✓ Correct Answer: A  Concept / Tip: Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0406 / 1000

6. Chemical Equilibrium & Le Chatelier

406. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 5)

- A. H_2 B. H_2O
C. O_2 D. Both equally

✓ Correct Answer: C  Concept / Tip: 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0407 / 1000

7. Reaction Kinetics & Activation Energy

407. The maximum amount of product predicted by stoichiometric calculations is? (Set 5)

- A. Actual yield B. Percent yield
C. Theoretical yield D. Experimental yield

✓ Correct Answer: C  Concept / Tip: Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0408 / 1000

8. Thermochemistry & Energetics

408. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 5)

- A. Boyle's law B. Charles's law
C. Avogadro's law D. Graham's law

✓ Correct Answer: C  Concept / Tip: $V \propto n$ at constant T and P.

MCQ 0409 / 1000

9. Electrochemistry & Redox

409. For an ionic compound, the representative particle is best termed as? (Set 5)

- A. Molecule B. Atom
C. Formula unit D. Ion pair

✓ Correct Answer: C  Concept / Tip: Ionic lattices are described by formula units.

MCQ 0410 / 1000

10. Chemical Bonding, VSEPR & Hybridization

410. Mass of 0.5 mole of water (H_2O) is? (Set 5)

- A. 9 g B. 18 g
C. 36 g D. 4.5 g

✓ Correct Answer: A  Concept / Tip: Mass = $n \times M = 0.5 \times 18 = 9$ g.

MCQ 0411 / 1000

11. s- and p-Block Elements

411. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 5)

- A. 0, 1 B. 1, 2, 3
C. 0, 1, 2, 3 D. 0, 1, 2

✓ Correct Answer: D  Concept / Tip: l ranges from 0 to $(n - 1)$.

MCQ 0412 / 1000

12. Transition Elements & Coordination

412. The azimuthal quantum number (l) specifies the? (Set 5)

- A. Main energy level B. Shape of the subshell
C. Orientation of orbital D. Spin direction

✓ Correct Answer: B  Concept / Tip: s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0413 / 1000

13. Fundamental Organic Chemistry & Isomerism

413. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 5)

- A. $[\text{Ar}] 3d^4 4s^2$ B. $[\text{Ar}] 3d^5 4s^1$
C. $[\text{Ar}] 3d^3 4s^3$ D. $[\text{Ar}] 3d^6 4s^0$

✓ Correct Answer: B  Concept / Tip: Half-filled d^5 configuration imparts extra stability.

MCQ 0414 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

414. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 5)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C**  **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0415 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

415. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 5)

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C**  **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0416 / 1000

16. Alcohols & Phenols

416. The total number of orbitals present in the $n = 3$ shell is? (Set 5)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C**  **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0417 / 1000

17. Aldehydes & Ketones

417. Positive rays (canal rays) were discovered by? (Set 5)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B**  **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0418 / 1000

18. Carboxylic Acids & Derivatives

418. Hund's rule states that degenerate orbitals are occupied? (Set 5)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C**  **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0419 / 1000

19. Macromolecules (Proteins & Enzymes)

419. An s orbital has what geometric shape? (Set 5)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C**  **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0420 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

420. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 5)

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B**  **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0421 / 1000

1. Stoichiometry & Moles

421. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 5)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B**  **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0422 / 1000

2. Atomic Structure & Quantum Theory

422. Ideal gas behavior is best approached under which conditions? (Set 5)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B**  **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0423 / 1000

3. Gas Laws & Kinetic Molecular Theory

423. The SI unit of the universal gas constant R is? (Set 5)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$ B. $\text{J K}^{-1} \text{ mol}^{-1}$
 C. $\text{cal K}^{-1} \text{ mol}^{-1}$ D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0424 / 1000

4. Liquids & Hydrogen Bonding

424. Absolute zero corresponds to approximately? (Set 5)

- A. 0°C B. 100°C
 C. -273°C D. -100°C

✓ **Correct Answer: C** 💡 **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0425 / 1000

5. Solids & Lattice Energy

425. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 5)

- A. Temperature B. Pressure
 C. Molar mass or density D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1/\sqrt{M}$.

MCQ 0426 / 1000

6. Chemical Equilibrium & Le Chatelier

426. Dalton's law applies to mixtures of gases that are? (Set 5)

- A. Reacting strongly B. Non-reacting
 C. Polar only D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

MCQ 0427 / 1000

7. Reaction Kinetics & Activation Energy

427. A gas occupies 3 dm^3 at 150 K. At constant pressure, its volume at 300 K is? (Set 5)

- A. 1.5 dm^3 B. 6 dm^3
 C. 9 dm^3 D. 12 dm^3

✓ **Correct Answer: B** 💡 **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

MCQ 0428 / 1000

8. Thermochemistry & Energetics

428. Real gases deviate from ideal gas behavior because real gas molecules? (Set 5)

- A. Have no mass B. Have finite volume and attractions
 C. Do not collide D. Have zero kinetic energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0429 / 1000

9. Electrochemistry & Redox

429. Average kinetic energy of gas molecules is directly proportional to? (Set 5)

- A. Volume B. Pressure
 C. Absolute temperature D. Molar mass

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{KE}_{\text{avg}} = (3/2) RT$.

MCQ 0430 / 1000

10. Chemical Bonding, VSEPR & Hybridization

430. Under school-level traditional STP, traditional temperature and pressure are? (Set 5)

- A. 298 K, 1 atm B. 273 K, 1 atm
 C. 0 K, 1 atm D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0431 / 1000

11. s- and p-Block Elements

431. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 5)

- A. Ionic bonding B. Covalent bonding
 C. Open hydrogen-bonded structure D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

12. Transition Elements & Coordination

MCQ 0432 / 1000

432. A liquid boils when its vapor pressure becomes equal to? (Set 5)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{\text{vap}} = P_{\text{ext}}$.

13. Fundamental Organic Chemistry & Isomerism

MCQ 0433 / 1000

433. Evaporation is a cooling process because escaping surface molecules have? (Set 5)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

MCQ 0434 / 1000

434. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 5)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

15. Alkyl Halides (SN1, SN2, E1, E2)

MCQ 0435 / 1000

435. Intermolecular forces in liquids are generally? (Set 5)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

16. Alcohols & Phenols

MCQ 0436 / 1000

436. Surface tension arises due to? (Set 5)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

17. Aldehydes & Ketones

MCQ 0437 / 1000

437. A volatile liquid generally possesses? (Set 5)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

18. Carboxylic Acids & Derivatives

MCQ 0438 / 1000

438. Viscosity of a liquid generally decreases as temperature? (Set 5)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

19. Macromolecules (Proteins & Enzymes)

MCQ 0439 / 1000

439. Which liquid exhibits the strongest hydrogen bonding? (Set 5)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

MCQ 0440 / 1000

440. Capillary action of liquids is driven by the balance between? (Set 5)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0441 / 1000

1. Stoichiometry & Moles

441. A crystalline solid differs from an amorphous solid in possessing? (Set 5)

- A. Sharp melting point and long-range order
 B. Gradual softening range
 C. Isotropic properties only
 D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0442 / 1000

2. Atomic Structure & Quantum Theory

442. Covalent network solids like diamond are characterized by? (Set 5)

- A. Low melting point
 B. Extreme hardness and high melting point
 C. High electrical conductivity as solid
 D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0443 / 1000

3. Gas Laws & Kinetic Molecular Theory

443. Lattice energy is defined as energy released when? (Set 5)

- A. 1 mole of solid melts
 B. Gaseous ions form 1 mole of ionic solid
 C. Solid dissolves in water
 D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0444 / 1000

4. Liquids & Hydrogen Bonding

444. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 5)

- A. Mg^{2+} and O^{2-} have higher ionic charges
 B. Na^+ is smaller than Mg^{2+}
 C. Cl^- is smaller than O^{2-}
 D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0445 / 1000

5. Solids & Lattice Energy

445. Ionic solids conduct electricity? (Set 5)

- A. In solid state only
 B. When molten or in aqueous solution
 C. Under no conditions
 D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0446 / 1000

6. Chemical Equilibrium & Le Chatelier

446. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 5)

- A. Atom
 B. Molecule
 C. Unit cell
 D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0447 / 1000

7. Reaction Kinetics & Activation Energy

447. Ionic crystals are brittle because shifting layers bring? (Set 5)

- A. Opposite charges together
 B. Like charges close together
 C. Electrons into nucleus
 D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0448 / 1000

8. Thermochemistry & Energetics

448. Molecular crystals like iodine (I_2) are held together by? (Set 5)

- A. Strong ionic bonds
 B. Metallic bonding
 C. Weak intermolecular forces (London forces)
 D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0449 / 1000

9. Electrochemistry & Redox

449. Anisotropy in crystalline solids means physical properties? (Set 5)

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0450 / 1000

10. Chemical Bonding, VSEPR & Hybridization

450. In NaCl crystal lattice, each Na^+ ion is surrounded octahedrally by how many Cl^- ions? (Set 5)

- A. 4
B. 6
C. 8
D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0451 / 1000

11. s- and p-Block Elements

451. Dynamic equilibrium in a reversible reaction is achieved when? (Set 5)

- A. Forward reaction stops
B. Forward and reverse reaction rates become equal
C. Concentrations of reactants reach zero
D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0452 / 1000

12. Transition Elements & Coordination

452. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 5)

- A. Reactants
B. Products
C. Neither side
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles ($3 \rightarrow 2$).

MCQ 0453 / 1000

13. Fundamental Organic Chemistry & Isomerism

453. Adding a catalyst to a reaction at equilibrium? (Set 5)

- A. Increases K_c
B. Shifts position to products
C. Speeds up attainment of equilibrium without shifting position
D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0454 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

454. An acidic buffer solution can be prepared by mixing? (Set 5)

- A. Strong acid and strong base
B. Weak acid and its conjugate base salt
C. Weak base and strong base
D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0455 / 1000

15. Alkyl Halides ($\text{S}_{\text{N}}1$, $\text{S}_{\text{N}}2$, $\text{E}1$, $\text{E}2$)**455. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 5)**

- A. $[\text{M}^{2+}][\text{X}^-]$
B. $[\text{M}^{2+}][\text{X}^-]^2$
C. $[\text{M}^{2+}]^2[\text{X}^-]$
D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{\text{sp}} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0456 / 1000

16. Alcohols & Phenols

456. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 5)

- A. Increase
B. Decrease
C. Remain unchanged
D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0457 / 1000

17. Aldehydes & Ketones

457. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 5)

- A. Products
B. Reactants
C. No shift
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0458 / 1000

18. Carboxylic Acids & Derivatives

458. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 5)

- A. Pressure
B. Concentration
C. Temperature
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0459 / 1000

19. Macromolecules (Proteins & Enzymes)

459. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 5)

- A. Only acid
B. Only base
C. Both acid and base
D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0460 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

460. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 5)

- A. Low pressure and high T
B. High pressure and low T
C. Low pressure and low T
D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0461 / 1000

1. Stoichiometry & Moles

461. The unit of rate constant (k) for a first-order reaction is? (Set 5)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
B. s^{-1}
C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0462 / 1000

2. Atomic Structure & Quantum Theory

462. A catalyst increases reaction rate primarily by? (Set 5)

- A. Increasing collision frequency only
B. Lowering activation energy barrier
C. Shifting equilibrium position
D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0463 / 1000

3. Gas Laws & Kinetic Molecular Theory

463. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 5)

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0464 / 1000

4. Liquids & Hydrogen Bonding

464. Activation energy (E_a) is best defined as? (Set 5)

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0465 / 1000

5. Solids & Lattice Energy

465. A zero-order reaction has a rate that is? (Set 5)

- A. Directly proportional to concentration
B. Independent of reactant concentration
C. Proportional to square of concentration
D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}]^0 = k$.

MCQ 0466 / 1000

6. Chemical Equilibrium & Le Chatelier

466. Increasing surface area of a solid reactant increases reaction rate because? (Set 5)

- A. It lowers activation energy
B. It increases exposed surface for effective collisions
C. It changes equilibrium constant
D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0467 / 1000

7. Reaction Kinetics & Activation Energy

467. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 5)

- A. Directly proportional to initial concentration
B. Inversely proportional to initial concentration
C. Independent of initial concentration
D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0468 / 1000

8. Thermochemistry & Energetics

468. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 5)

- A. Fast step
B. Rate-determining step
C. Equilibrium step
D. Initiation step

✓ **Correct Answer: B**  **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0469 / 1000

9. Electrochemistry & Redox

469. Increasing temperature increases reaction rate mainly by? (Set 5)

- A. Decreasing reactant mass
B. Increasing fraction of molecules exceeding activation energy
C. Eliminating activation energy
D. Changing reaction order

✓ **Correct Answer: B**  **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0470 / 1000

10. Chemical Bonding, VSEPR & Hybridization

470. The activated complex (transition state) is? (Set 5)

- A. A stable intermediate
B. A high-energy, unstable temporary arrangement
C. The final product
D. The unreacted starting material

✓ **Correct Answer: B**  **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0471 / 1000

11. s- and p-Block Elements

471. An exothermic reaction is characterized by? (Set 5)

- A. Positive ΔH
B. Negative ΔH
C. Zero ΔH
D. Absorption of heat

✓ **Correct Answer: B**  **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0472 / 1000

12. Transition Elements & Coordination

472. Hess's law of constant heat summation is a direct application of conservation of? (Set 5)

- A. Mass
B. Charge
C. Energy
D. Momentum

✓ **Correct Answer: C**  **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0473 / 1000

13. Fundamental Organic Chemistry & Isomerism

473. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 5)

- A. Always positive
B. Always negative
C. Defined as zero
D. 100 kJ/mol

✓ **Correct Answer: C**  **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0474 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

474. A state function depends on? (Set 5)

- A. The specific path taken
B. Initial and final states only
C. Rate of reaction
D. Catalyst used

✓ **Correct Answer: B**  **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0475 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

475. At constant pressure, the heat change accompanying a reaction equals? (Set 5)

- A. Internal energy change ΔU
B. Enthalpy change ΔH
C. Work done w
D. Equilibrium constant K

✓ **Correct Answer: B**  **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0476 / 1000

16. Alcohols & Phenols

476. The first law of thermodynamics is expressed mathematically as? (Set 5)

- A. $\Delta U = q + w$
B. $\Delta H = q - w$
C. $PV = nRT$
D. $q = m c \Delta T$

✓ **Correct Answer: A**  **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0477 / 1000

17. Aldehydes & Ketones

477. Bond breaking is always an? (Set 5)

- A. Exothermic process
B. Endothermic process
C. Isothermal process
D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0478 / 1000

18. Carboxylic Acids & Derivatives

478. A reaction that absorbs heat from surroundings is described as? (Set 5)

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0479 / 1000

19. Macromolecules (Proteins & Enzymes)

479. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 5)

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0480 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

480. In a bomb calorimeter, heat change is measured at constant? (Set 5)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0481 / 1000

1. Stoichiometry & Moles

481. In an electrochemical cell, oxidation always occurs at the? (Set 5)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0482 / 1000

2. Atomic Structure & Quantum Theory

482. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 5)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0483 / 1000

3. Gas Laws & Kinetic Molecular Theory

483. Reduction is defined as the? (Set 5)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0484 / 1000

4. Liquids & Hydrogen Bonding

484. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 5)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0485 / 1000

5. Solids & Lattice Energy

485. A salt bridge in a galvanic cell serves to? (Set 5)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

6. Chemical Equilibrium & Le Chatelier

MCQ 0486 / 1000

486. Standard cell EMF (E°_{cell}) is calculated as? (Set 5)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$ B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
 C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$ D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ Correct Answer: B  Concept / Tip: $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

7. Reaction Kinetics & Activation Energy

MCQ 0487 / 1000

487. A species with a highly negative standard reduction potential acts as a? (Set 5)

- A. Strong oxidizing agent B. Strong reducing agent
 C. Weak reducing agent D. Inert species

✓ Correct Answer: B  Concept / Tip: Readily loses electrons (easily oxidized).

8. Thermochemistry & Energetics

MCQ 0488 / 1000

488. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 5)

- A. Anode B. Cathode
 C. Salt bridge D. Electrolyte surface

✓ Correct Answer: B  Concept / Tip: $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

9. Electrochemistry & Redox

MCQ 0489 / 1000

489. The oxidation number of sulfur in H_2SO_4 is? (Set 5)

- A. +2 B. +4
 C. +6 D. -2

✓ Correct Answer: C  Concept / Tip: $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0490 / 1000

490. Corrosion of iron (rusting) is fundamentally an? (Set 5)

- A. Acid-base reaction B. Electrochemical (redox) process
 C. Elimination reaction D. Isothermal physical change

✓ Correct Answer: B  Concept / Tip: Iron acts as anode and oxygen reduction occurs at cathodic sites.

11. s- and p-Block Elements

MCQ 0491 / 1000

491. According to VSEPR theory, CH_4 has what molecular geometry? (Set 5)

- A. Linear B. Trigonal planar
 C. Tetrahedral D. Bent

✓ Correct Answer: C  Concept / Tip: 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

12. Transition Elements & Coordination

MCQ 0492 / 1000

492. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 5)

- A. 3 lone pairs B. Repulsion from 1 lone pair on nitrogen
 C. 2 lone pairs D. Nonpolar C-H bonds

✓ Correct Answer: B  Concept / Tip: 1 lone pair distorts bond angle to $\sim 107^\circ$.

13. Fundamental Organic Chemistry & Isomerism

MCQ 0493 / 1000

493. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 5)

- A. sp^3 B. sp^2
 C. sp D. dsp^2

✓ Correct Answer: B  Concept / Tip: 3 sigma domains = sp^2 hybridization with 120° planar geometry.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

MCQ 0494 / 1000

494. A double covalent bond consists of? (Set 5)

- A. Two sigma bonds B. Two pi bonds
 C. One sigma and one pi bond D. One sigma bond only

✓ Correct Answer: C  Concept / Tip: First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0495 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

495. BF₃ molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 5)

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0496 / 1000

16. Alcohols & Phenols

496. A pi (π) bond is formed by? (Set 5)

- A. Head-on s-s overlap
B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap
D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0497 / 1000

17. Aldehydes & Ketones

497. SF₆ central sulfur atom exhibits which hybridization and shape? (Set 5)

- A. sp³, Tetrahedral
B. sp³d², Octahedral
C. sp³d, Trigonal bipyramidal
D. sp², Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp³d² octahedral.

MCQ 0498 / 1000

18. Carboxylic Acids & Derivatives

498. Bond energy generally increases as bond length? (Set 5)

- A. Increases
B. Decreases
C. Remains constant
D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0499 / 1000

19. Macromolecules (Proteins & Enzymes)

499. Hybridization of central carbon in ethyne (HC≡CH) is? (Set 5)

- A. sp³
B. sp²
C. sp
D. dsp²

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0500 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

500. The molecule H₂O has a bent shape with a bond angle of ~104.5° due to? (Set 5)

- A. No lone pairs
B. 1 lone pair
C. 2 lone pairs on oxygen
D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0501 / 1000

1. Stoichiometry & Moles

501. The number of particles present in 1 mole of any substance is called? (Set 6)

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0502 / 1000

2. Atomic Structure & Quantum Theory

502. One mole of C₁₂H₂₂O₁₁ (sucrose) has a molar mass of? (Set 6)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342$ g/mol.

MCQ 0503 / 1000

3. Gas Laws & Kinetic Molecular Theory

503. To identify the limiting reagent, available moles of each reactant are compared with? (Set 6)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

4. Liquids & Hydrogen Bonding

A. 11.2 dm³
B. 44.8 dm³
C. 24.0 dm³
D. 22.4 dm³

5. Solids & Lattice Energy

A. 90%
B. 80%
C. 75%
D. 95%

6. Chemical Equilibrium & Le Chatelier

A. H_2
B. H_2O
C. O_2
D. Both equally

7. Reaction Kinetics & Activation Energy

A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

8. Thermochemistry & Energetics

A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

9. Electrochemistry & Redox

A. Molecule
B. Atom
C. Formula unit
D. Ion pair

10. Chemical Bonding, VSEPR & Hybridization

A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

11. s- and p-Block Elements

A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

12. Transition Elements & Coordination

A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

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13. Fundamental Organic Chemistry & Isomerism

513. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 6)

- A. $[\text{Ar}] 3d^4 4s^2$
B. $[\text{Ar}] 3d^5 4s^1$
C. $[\text{Ar}] 3d^3 4s^3$
D. $[\text{Ar}] 3d^6 4s^0$

✓ **Correct Answer: B** **Concept / Tip:** Half-filled d^5 configuration imparts extra stability.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

514. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 6)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

15. Alkyl Halides (SN1, SN2, E1, E2)

515. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 6)

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** **Concept / Tip:** No two electrons share all 4 quantum numbers.

16. Alcohols & Phenols

516. The total number of orbitals present in the $n = 3$ shell is? (Set 6)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

17. Aldehydes & Ketones

517. Positive rays (canal rays) were discovered by? (Set 6)

- A. J.J. Thomson
C. James Chadwick
- B. Eugen Goldstein
D. Ernest Rutherford

✓ **Correct Answer: B** **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

18. Carboxylic Acids & Derivatives

518. Hund's rule states that degenerate orbitals are occupied? (Set 6)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** **Concept / Tip:** Maximizes total electron spin before pairing.

19. Macromolecules (Proteins & Enzymes)

519. An s orbital has what geometric shape? (Set 6)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** **Concept / Tip:** s orbitals are spherically symmetric.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

520. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 6)

- A. $n = 1$
C. $n = 3$
- B. $n = 2$
D. $n = 4$

✓ **Correct Answer: B** **Concept / Tip:** Balmer series lines fall in the visible spectrum.

1. Stoichiometry & Moles

521. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 6)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ Correct Answer: B  Concept / Tip: $P_1V_1 = P_2V_2$ at constant T and n.

2. Atomic Structure & Quantum Theory

MCQ 0522 / 1000

522. Ideal gas behavior is best approached under which conditions? (Set 6)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B**  **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

3. Gas Laws & Kinetic Molecular Theory

MCQ 0523 / 1000

523. The SI unit of the universal gas constant R is? (Set 6)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B**  **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

4. Liquids & Hydrogen Bonding

MCQ 0524 / 1000

524. Absolute zero corresponds to approximately? (Set 6)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C**  **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

5. Solids & Lattice Energy

MCQ 0525 / 1000

525. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 6)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C**  **Concept / Tip:** $\text{Rate} \propto 1 / \sqrt{M}$.

6. Chemical Equilibrium & Le Chatelier

MCQ 0526 / 1000

526. Dalton's law applies to mixtures of gases that are? (Set 6)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B**  **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

7. Reaction Kinetics & Activation Energy

MCQ 0527 / 1000

527. A gas occupies 3 dm^3 at 150 K. At constant pressure, its volume at 300 K is? (Set 6)

- A. 1.5 dm^3
B. 6 dm^3
C. 9 dm^3
D. 12 dm^3

✓ **Correct Answer: B**  **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

8. Thermochemistry & Energetics

MCQ 0528 / 1000

528. Real gases deviate from ideal gas behavior because real gas molecules? (Set 6)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B**  **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

9. Electrochemistry & Redox

MCQ 0529 / 1000

529. Average kinetic energy of gas molecules is directly proportional to? (Set 6)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C**  **Concept / Tip:** $\text{KE}_{\text{avg}} = (3/2) RT$.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0530 / 1000

530. Under school-level traditional STP, traditional temperature and pressure are? (Set 6)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B**  **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0531 / 1000

11. s- and p-Block Elements

531. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 6)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0532 / 1000

12. Transition Elements & Coordination

532. A liquid boils when its vapor pressure becomes equal to? (Set 6)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{\text{vap}} = P_{\text{ext}}$.

MCQ 0533 / 1000

13. Fundamental Organic Chemistry & Isomerism

533. Evaporation is a cooling process because escaping surface molecules have? (Set 6)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0534 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

534. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 6)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0535 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

535. Intermolecular forces in liquids are generally? (Set 6)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0536 / 1000

16. Alcohols & Phenols

536. Surface tension arises due to? (Set 6)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0537 / 1000

17. Aldehydes & Ketones

537. A volatile liquid generally possesses? (Set 6)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0538 / 1000

18. Carboxylic Acids & Derivatives

538. Viscosity of a liquid generally decreases as temperature? (Set 6)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0539 / 1000

19. Macromolecules (Proteins & Enzymes)

539. Which liquid exhibits the strongest hydrogen bonding? (Set 6)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0540 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

540. Capillary action of liquids is driven by the balance between? (Set 6)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0541 / 1000

1. Stoichiometry & Moles

541. A crystalline solid differs from an amorphous solid in possessing? (Set 6)

- A. Sharp melting point and long-range order
B. Gradual softening range
C. Isotropic properties only
D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0542 / 1000

2. Atomic Structure & Quantum Theory

542. Covalent network solids like diamond are characterized by? (Set 6)

- A. Low melting point
B. Extreme hardness and high melting point
C. High electrical conductivity as solid
D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0543 / 1000

3. Gas Laws & Kinetic Molecular Theory

543. Lattice energy is defined as energy released when? (Set 6)

- A. 1 mole of solid melts
B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water
D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0544 / 1000

4. Liquids & Hydrogen Bonding

544. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 6)

- A. Mg^{2+} and O^{2-} have higher ionic charges
B. Na^+ is smaller than Mg^{2+}
C. Cl^- is smaller than O^{2-}
D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0545 / 1000

5. Solids & Lattice Energy

545. Ionic solids conduct electricity? (Set 6)

- A. In solid state only
B. When molten or in aqueous solution
C. Under no conditions
D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0546 / 1000

6. Chemical Equilibrium & Le Chatelier

546. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 6)

- A. Atom
B. Molecule
C. Unit cell
D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0547 / 1000

7. Reaction Kinetics & Activation Energy

547. Ionic crystals are brittle because shifting layers bring? (Set 6)

- A. Opposite charges together
B. Like charges close together
C. Electrons into nucleus
D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0548 / 1000

8. Thermochemistry & Energetics

548. Molecular crystals like iodine (I_2) are held together by? (Set 6)

- A. Strong ionic bonds
B. Metallic bonding
C. Weak intermolecular forces (London forces)
D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0549 / 1000

9. Electrochemistry & Redox

549. Anisotropy in crystalline solids means physical properties? (Set 6)

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0550 / 1000

10. Chemical Bonding, VSEPR & Hybridization

550. In NaCl crystal lattice, each Na^+ ion is surrounded octahedrally by how many Cl^- ions? (Set 6)

- A. 4
 B. 6
 C. 8
 D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0551 / 1000

11. s- and p-Block Elements

551. Dynamic equilibrium in a reversible reaction is achieved when? (Set 6)

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0552 / 1000

12. Transition Elements & Coordination

552. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 6)

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles ($3 \rightarrow 2$).

MCQ 0553 / 1000

13. Fundamental Organic Chemistry & Isomerism

553. Adding a catalyst to a reaction at equilibrium? (Set 6)

- A. Increases K_c
 B. Shifts position to products
 C. Speeds up attainment of equilibrium without shifting position
 D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0554 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

554. An acidic buffer solution can be prepared by mixing? (Set 6)

- A. Strong acid and strong base
 B. Weak acid and its conjugate base salt
 C. Weak base and strong base
 D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0555 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)**555. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 6)**

- A. $[\text{M}^{2+}][\text{X}^-]$
 B. $[\text{M}^{2+}][\text{X}^-]^2$
 C. $[\text{M}^{2+}]^2[\text{X}^-]$
 D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{sp} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0556 / 1000

16. Alcohols & Phenols

556. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 6)

- A. Increase
 B. Decrease
 C. Remain unchanged
 D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0557 / 1000

17. Aldehydes & Ketones

557. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 6)

- A. Products
 B. Reactants
 C. No shift
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0558 / 1000

18. Carboxylic Acids & Derivatives

558. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 6)

- A. Pressure
B. Concentration
C. Temperature
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0559 / 1000

19. Macromolecules (Proteins & Enzymes)

559. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 6)

- A. Only acid
B. Only base
C. Both acid and base
D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0560 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

560. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 6)

- A. Low pressure and high T
B. High pressure and low T
C. Low pressure and low T
D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0561 / 1000

1. Stoichiometry & Moles

561. The unit of rate constant (k) for a first-order reaction is? (Set 6)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
B. s^{-1}
C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0562 / 1000

2. Atomic Structure & Quantum Theory

562. A catalyst increases reaction rate primarily by? (Set 6)

- A. Increasing collision frequency only
B. Lowering activation energy barrier
C. Shifting equilibrium position
D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0563 / 1000

3. Gas Laws & Kinetic Molecular Theory

563. If doubling $[\text{A}]$ quadruples the rate of reaction, the order with respect to A is? (Set 6)

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0564 / 1000

4. Liquids & Hydrogen Bonding

564. Activation energy (E_a) is best defined as? (Set 6)

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0565 / 1000

5. Solids & Lattice Energy

565. A zero-order reaction has a rate that is? (Set 6)

- A. Directly proportional to concentration
B. Independent of reactant concentration
C. Proportional to square of concentration
D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}]^0 = k$.

MCQ 0566 / 1000

6. Chemical Equilibrium & Le Chatelier

566. Increasing surface area of a solid reactant increases reaction rate because? (Set 6)

- A. It lowers activation energy
B. It increases exposed surface for effective collisions
C. It changes equilibrium constant
D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0567 / 1000

7. Reaction Kinetics & Activation Energy

567. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 6)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0568 / 1000

8. Thermochemistry & Energetics

568. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 6)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0569 / 1000

9. Electrochemistry & Redox

569. Increasing temperature increases reaction rate mainly by? (Set 6)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0570 / 1000

10. Chemical Bonding, VSEPR & Hybridization

570. The activated complex (transition state) is? (Set 6)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0571 / 1000

11. s- and p-Block Elements

571. An exothermic reaction is characterized by? (Set 6)

- A. Positive ΔH
 B. Negative ΔH
 C. Zero ΔH
 D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0572 / 1000

12. Transition Elements & Coordination

572. Hess's law of constant heat summation is a direct application of conservation of? (Set 6)

- A. Mass
 B. Charge
 C. Energy
 D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0573 / 1000

13. Fundamental Organic Chemistry & Isomerism

573. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 6)

- A. Always positive
 B. Always negative
 C. Defined as zero
 D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0574 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

574. A state function depends on? (Set 6)

- A. The specific path taken
 B. Initial and final states only
 C. Rate of reaction
 D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0575 / 1000

15. Alkyl Halides (S_N1 , S_N2 , E1, E2)**575. At constant pressure, the heat change accompanying a reaction equals? (Set 6)**

- A. Internal energy change ΔU
 B. Enthalpy change ΔH
 C. Work done w
 D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

16. Alcohols & Phenols

A. $\Delta U = q + w$
C. $PV = nRT$

B. $\Delta H = q - w$
D. $q = m c \Delta T$

✓ **Correct Answer: A** **Concept / Tip:** Internal energy change = heat added + work done on system.

17. Aldehydes & Ketones

A. Exothermic process
C. Isothermal process

B. Endothermic process
D. Energy-neutral process

✓ **Correct Answer: B** **Concept / Tip:** Energy input is required to cleave chemical bonds.

18. Carboxylic Acids & Derivatives

A. Exothermic
C. Spontaneous always

B. Endothermic
D. Adiabatic

✓ **Correct Answer: B** **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

19. Macromolecules (Proteins & Enzymes)

A. 100°C
C. 0.1 K

B. 1 K or 1°C

D. 10 K

✓ **Correct Answer: B**  **Concept / Tip:** $C = q / \Delta T$.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

A. Pressure
C. Temperature

B. Volume

D. Concentration

✓ **Correct Answer: B** **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

1. Stoichiometry & Moles

A. Cathode

C. Salt bridge

B. Anode
D. Voltmeter

✓ **Correct Answer: B** **Concept / Tip:** AnOx: Anode = Oxidation.

2. Atomic Structure & Quantum Theory

A. Heat energy only
C. Nuclear energy

B. Electrical energy
D. Mechanical energy

✓ **Correct Answer: B**  **Concept / Tip:** Spontaneous redox reaction drives electron flow.

3. Gas Laws & Kinetic Molecular Theory

A. Loss of electrons
C. Gain of oxygen

B. Gain of electrons

D. Increase in oxidation state

✓ Correct Answer: B **Concept / Tip:** RIG: Reduction Is Gain of electrons.

4. Liquids & Hydrogen Bonding

A. 1.00 V

C. 0.00 V

B. -1.00 V

D. 0.76 V

✓ **Correct Answer: C** **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0585 / 1000

5. Solids & Lattice Energy

585. A salt bridge in a galvanic cell serves to? (Set 6)

- A. Allow electron flow through it
 B. Maintain electrical neutrality in half-cells
 C. Stop ion movement
 D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0586 / 1000

6. Chemical Equilibrium & Le Chatelier

586. Standard cell EMF (E°_{cell}) is calculated as? (Set 6)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
 B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
 C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
 D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0587 / 1000

7. Reaction Kinetics & Activation Energy

587. A species with a highly negative standard reduction potential acts as a? (Set 6)

- A. Strong oxidizing agent
 B. Strong reducing agent
 C. Weak reducing agent
 D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0588 / 1000

8. Thermochemistry & Energetics

588. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 6)

- A. Anode
 B. Cathode
 C. Salt bridge
 D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0589 / 1000

9. Electrochemistry & Redox

589. The oxidation number of sulfur in H_2SO_4 is? (Set 6)

- A. +2
 B. +4
 C. +6
 D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0590 / 1000

10. Chemical Bonding, VSEPR & Hybridization

590. Corrosion of iron (rusting) is fundamentally an? (Set 6)

- A. Acid-base reaction
 B. Electrochemical (redox) process
 C. Elimination reaction
 D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0591 / 1000

11. s- and p-Block Elements

591. According to VSEPR theory, CH_4 has what molecular geometry? (Set 6)

- A. Linear
 B. Trigonal planar
 C. Tetrahedral
 D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0592 / 1000

12. Transition Elements & Coordination

592. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 6)

- A. 3 lone pairs
 B. Repulsion from 1 lone pair on nitrogen
 C. 2 lone pairs
 D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0593 / 1000

13. Fundamental Organic Chemistry & Isomerism

593. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 6)

- A. sp^3
 B. sp^2
 C. sp
 D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0594 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

594. A double covalent bond consists of? (Set 6)

- A. Two sigma bonds
B. Two pi bonds
C. One sigma and one pi bond
D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0595 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

595. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 6)

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0596 / 1000

16. Alcohols & Phenols

596. A pi (π) bond is formed by? (Set 6)

- A. Head-on s-s overlap
B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap
D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0597 / 1000

17. Aldehydes & Ketones

597. SF_6 central sulfur atom exhibits which hybridization and shape? (Set 6)

- A. sp^3 , Tetrahedral
B. sp^3d^2 , Octahedral
C. sp^3d , Trigonal bipyramidal
D. sp^2 , Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp^3d^2 octahedral.

MCQ 0598 / 1000

18. Carboxylic Acids & Derivatives

598. Bond energy generally increases as bond length? (Set 6)

- A. Increases
B. Decreases
C. Remains constant
D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0599 / 1000

19. Macromolecules (Proteins & Enzymes)

599. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 6)

- A. sp^3
B. sp^2
C. sp
D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0600 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

600. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 6)

- A. No lone pairs
B. 1 lone pair
C. 2 lone pairs on oxygen
D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0601 / 1000

1. Stoichiometry & Moles

601. The number of particles present in 1 mole of any substance is called? (Set 7)

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0602 / 1000

2. Atomic Structure & Quantum Theory

602. One mole of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sucrose) has a molar mass of? (Set 7)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0603 / 1000

3. Gas Laws & Kinetic Molecular Theory

603. To identify the limiting reagent, available moles of each reactant are compared with? (Set 7)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ **Correct Answer: D**  **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0604 / 1000

4. Liquids & Hydrogen Bonding

604. At STP, one mole of an ideal gas occupies a volume of? (Set 7)

- A. 11.2 dm³
B. 44.8 dm³
C. 24.0 dm³
D. 22.4 dm³

✓ **Correct Answer: D**  **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm³.

MCQ 0605 / 1000

5. Solids & Lattice Energy

605. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 7)

- A. 90%
B. 80%
C. 75%
D. 95%

✓ **Correct Answer: A**  **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0606 / 1000

6. Chemical Equilibrium & Le Chatelier

606. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 7)

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ **Correct Answer: C**  **Concept / Tip:** 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0607 / 1000

7. Reaction Kinetics & Activation Energy

607. The maximum amount of product predicted by stoichiometric calculations is? (Set 7)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ **Correct Answer: C**  **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0608 / 1000

8. Thermochemistry & Energetics

608. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 7)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ **Correct Answer: C**  **Concept / Tip:** $V \propto n$ at constant T and P.

MCQ 0609 / 1000

9. Electrochemistry & Redox

609. For an ionic compound, the representative particle is best termed a? (Set 7)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C**  **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0610 / 1000

10. Chemical Bonding, VSEPR & Hybridization

610. Mass of 0.5 mole of water (H_2O) is? (Set 7)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A**  **Concept / Tip:** Mass = $n \times M = 0.5 \times 18 = 9$ g.

MCQ 0611 / 1000

11. s- and p-Block Elements

611. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 7)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D**  **Concept / Tip:** l ranges from 0 to $(n - 1)$.

MCQ 0612 / 1000

12. Transition Elements & Coordination

612. The azimuthal quantum number (l) specifies the? (Set 7)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0613 / 1000

13. Fundamental Organic Chemistry & Isomerism

613. The ground-state electronic configuration of Chromium (Z = 24) is? (Set 7)

- A. [Ar] 3d⁴ 4s²
B. [Ar] 3d⁵ 4s¹
C. [Ar] 3d³ 4s³
D. [Ar] 3d⁶ 4s⁰

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d⁵ configuration imparts extra stability.

MCQ 0614 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

614. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 7)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at n = 1 (UV region).

MCQ 0615 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

615. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 7)

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0616 / 1000

16. Alcohols & Phenols

616. The total number of orbitals present in the n = 3 shell is? (Set 7)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = n² = 3² = 9.

MCQ 0617 / 1000

17. Aldehydes & Ketones

617. Positive rays (canal rays) were discovered by? (Set 7)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0618 / 1000

18. Carboxylic Acids & Derivatives

618. Hund's rule states that degenerate orbitals are occupied? (Set 7)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0619 / 1000

19. Macromolecules (Proteins & Enzymes)

619. An s orbital has what geometric shape? (Set 7)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0620 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

620. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 7)

- A. n = 1
B. n = 2
C. n = 3
D. n = 4

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0621 / 1000

1. Stoichiometry & Moles

621. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 7)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B**  **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0622 / 1000

2. Atomic Structure & Quantum Theory

622. Ideal gas behavior is best approached under which conditions? (Set 7)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B**  **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0623 / 1000

3. Gas Laws & Kinetic Molecular Theory

623. The SI unit of the universal gas constant R is? (Set 7)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B**  **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0624 / 1000

4. Liquids & Hydrogen Bonding

624. Absolute zero corresponds to approximately? (Set 7)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C**  **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0625 / 1000

5. Solids & Lattice Energy

625. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 7)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C**  **Concept / Tip:** $\text{Rate} \propto 1 / \sqrt{M}$.

MCQ 0626 / 1000

6. Chemical Equilibrium & Le Chatelier

626. Dalton's law applies to mixtures of gases that are? (Set 7)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B**  **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

MCQ 0627 / 1000

7. Reaction Kinetics & Activation Energy

627. A gas occupies 3 dm^3 at 150 K. At constant pressure, its volume at 300 K is? (Set 7)

- A. 1.5 dm^3
B. 6 dm^3
C. 9 dm^3
D. 12 dm^3

✓ **Correct Answer: B**  **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

MCQ 0628 / 1000

8. Thermochemistry & Energetics

628. Real gases deviate from ideal gas behavior because real gas molecules? (Set 7)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B**  **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0629 / 1000

9. Electrochemistry & Redox

629. Average kinetic energy of gas molecules is directly proportional to? (Set 7)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C**  **Concept / Tip:** $\text{KE}_{\text{avg}} = (3/2) RT$.

MCQ 0630 / 1000

10. Chemical Bonding, VSEPR & Hybridization

630. Under school-level traditional STP, traditional temperature and pressure are? (Set 7)

- A. 298 K, 1 atm
 B. 273 K, 1 atm
 C. 0 K, 1 atm
 D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0631 / 1000

11. s- and p-Block Elements

631. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 7)

- A. Ionic bonding
 B. Covalent bonding
 C. Open hydrogen-bonded structure
 D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0632 / 1000

12. Transition Elements & Coordination

632. A liquid boils when its vapor pressure becomes equal to? (Set 7)

- A. Internal pressure
 B. External atmospheric pressure
 C. Zero pressure
 D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{\text{vap}} = P_{\text{ext}}$.

MCQ 0633 / 1000

13. Fundamental Organic Chemistry & Isomerism

633. Evaporation is a cooling process because escaping surface molecules have? (Set 7)

- A. Lowest kinetic energy
 B. Highest kinetic energy
 C. Zero energy
 D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0634 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

634. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 7)

- A. C, Si, P
 B. N, O, F
 C. Na, K, Ca
 D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0635 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

635. Intermolecular forces in liquids are generally? (Set 7)

- A. Stronger than in gases
 B. Weaker than in gases
 C. Equal to gases
 D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0636 / 1000

16. Alcohols & Phenols

636. Surface tension arises due to? (Set 7)

- A. Unbalanced inward cohesive forces at the surface
 B. Equal forces in all directions
 C. Gravitational force only
 D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0637 / 1000

17. Aldehydes & Ketones

637. A volatile liquid generally possesses? (Set 7)

- A. Strong intermolecular forces and high boiling point
 B. Weak intermolecular forces and high vapor pressure
 C. High boiling point and low vapor pressure
 D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0638 / 1000

18. Carboxylic Acids & Derivatives

638. Viscosity of a liquid generally decreases as temperature? (Set 7)

- A. Decreases
 B. Increases
 C. Remains constant
 D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0639 / 1000

19. Macromolecules (Proteins & Enzymes)

639. Which liquid exhibits the strongest hydrogen bonding? (Set 7)

- A. CH₄ B. H₂S
C. H₂O D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0640 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

640. Capillary action of liquids is driven by the balance between? (Set 7)

- A. Gravity and mass B. Adhesion and cohesion
C. Density and volume D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0641 / 1000

1. Stoichiometry & Moles

641. A crystalline solid differs from an amorphous solid in possessing? (Set 7)

- A. Sharp melting point and long-range order B. Gradual softening range
C. Isotropic properties only D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0642 / 1000

2. Atomic Structure & Quantum Theory

642. Covalent network solids like diamond are characterized by? (Set 7)

- A. Low melting point B. Extreme hardness and high melting point
C. High electrical conductivity as solid D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0643 / 1000

3. Gas Laws & Kinetic Molecular Theory

643. Lattice energy is defined as energy released when? (Set 7)

- A. 1 mole of solid melts B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0644 / 1000

4. Liquids & Hydrogen Bonding

644. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 7)

- A. Mg²⁺ and O²⁻ have higher ionic charges B. Na⁺ is smaller than Mg²⁺
C. Cl⁻ is smaller than O²⁻ D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0645 / 1000

5. Solids & Lattice Energy

645. Ionic solids conduct electricity? (Set 7)

- A. In solid state only B. When molten or in aqueous solution
C. Under no conditions D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0646 / 1000

6. Chemical Equilibrium & Le Chatelier

646. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 7)

- A. Atom B. Molecule
C. Unit cell D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0647 / 1000

7. Reaction Kinetics & Activation Energy

647. Ionic crystals are brittle because shifting layers bring? (Set 7)

- A. Opposite charges together B. Like charges close together
C. Electrons into nucleus D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0648 / 1000

8. Thermochemistry & Energetics

648. Molecular crystals like iodine (I₂) are held together by? (Set 7)

- A. Strong ionic bonds
B. Metallic bonding
C. Weak intermolecular forces (London forces)
D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0649 / 1000

9. Electrochemistry & Redox

649. Anisotropy in crystalline solids means physical properties? (Set 7)

- A. Are identical in all directions
B. Vary depending on directional orientation
C. Are zero in all directions
D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0650 / 1000

10. Chemical Bonding, VSEPR & Hybridization

650. In NaCl crystal lattice, each Na⁺ ion is surrounded octahedrally by how many Cl⁻ ions? (Set 7)

- A. 4
B. 6
C. 8
D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0651 / 1000

11. s- and p-Block Elements

651. Dynamic equilibrium in a reversible reaction is achieved when? (Set 7)

- A. Forward reaction stops
B. Forward and reverse reaction rates become equal
C. Concentrations of reactants reach zero
D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0652 / 1000

12. Transition Elements & Coordination

652. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 7)

- A. Reactants
B. Products
C. Neither side
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

MCQ 0653 / 1000

13. Fundamental Organic Chemistry & Isomerism

653. Adding a catalyst to a reaction at equilibrium? (Set 7)

- A. Increases K_c
B. Shifts position to products
C. Speeds up attainment of equilibrium without shifting position
D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0654 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

654. An acidic buffer solution can be prepared by mixing? (Set 7)

- A. Strong acid and strong base
B. Weak acid and its conjugate base salt
C. Weak base and strong base
D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: CH₃COOH + CH₃COONa.

MCQ 0655 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

655. For a sparingly soluble salt MX₂, the solubility product expression K_{sp} is? (Set 7)

- A. [M²⁺][X⁻]
B. [M²⁺][X⁻]²
C. [M²⁺]²[X⁻]
D. [MX₂]

✓ **Correct Answer: B** 💡 **Concept / Tip:** K_{sp} = [M²⁺][X⁻]² following stoichiometry.

MCQ 0656 / 1000

16. Alcohols & Phenols

656. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 7)

- A. Increase
B. Decrease
C. Remain unchanged
D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0657 / 1000

17. Aldehydes & Ketones

657. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 7)

- A. Products
B. Reactants
C. No shift
D. Catalyst

✓ **Correct Answer: B**  **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0658 / 1000

18. Carboxylic Acids & Derivatives

658. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 7)

- A. Pressure
B. Concentration
C. Temperature
D. Volume

✓ **Correct Answer: C**  **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0659 / 1000

19. Macromolecules (Proteins & Enzymes)

659. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 7)

- A. Only acid
B. Only base
C. Both acid and base
D. Neither acid nor base

✓ **Correct Answer: C**  **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0660 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

660. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 7)

- A. Low pressure and high T
B. High pressure and low T
C. Low pressure and low T
D. High pressure and high T

✓ **Correct Answer: B**  **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0661 / 1000

1. Stoichiometry & Moles

661. The unit of rate constant (k) for a first-order reaction is? (Set 7)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
B. s^{-1}
C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B**  **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0662 / 1000

2. Atomic Structure & Quantum Theory

662. A catalyst increases reaction rate primarily by? (Set 7)

- A. Increasing collision frequency only
B. Lowering activation energy barrier
C. Shifting equilibrium position
D. Increasing reactant temperature

✓ **Correct Answer: B**  **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0663 / 1000

3. Gas Laws & Kinetic Molecular Theory

663. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 7)

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B**  **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0664 / 1000

4. Liquids & Hydrogen Bonding

664. Activation energy (E_a) is best defined as? (Set 7)

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B**  **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0665 / 1000

5. Solids & Lattice Energy

665. A zero-order reaction has a rate that is? (Set 7)

- A. Directly proportional to concentration
B. Independent of reactant concentration
C. Proportional to square of concentration
D. Zero

✓ **Correct Answer: B**  **Concept / Tip:** $\text{Rate} = k[\text{A}]^0 = k$.

6. Chemical Equilibrium & Le Chatelier

MCQ 0666 / 1000

666. Increasing surface area of a solid reactant increases reaction rate because? (Set 7)

- A. It lowers activation energy
 B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant
 D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

7. Reaction Kinetics & Activation Energy

MCQ 0667 / 1000

667. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 7)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

8. Thermochemistry & Energetics

MCQ 0668 / 1000

668. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 7)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

9. Electrochemistry & Redox

MCQ 0669 / 1000

669. Increasing temperature increases reaction rate mainly by? (Set 7)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0670 / 1000

670. The activated complex (transition state) is? (Set 7)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

11. s- and p-Block Elements

MCQ 0671 / 1000

671. An exothermic reaction is characterized by? (Set 7)

- A. Positive ΔH
 B. Negative ΔH
 C. Zero ΔH
 D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

12. Transition Elements & Coordination

MCQ 0672 / 1000

672. Hess's law of constant heat summation is a direct application of conservation of? (Set 7)

- A. Mass
 B. Charge
 C. Energy
 D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

13. Fundamental Organic Chemistry & Isomerism

MCQ 0673 / 1000

673. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 7)

- A. Always positive
 B. Always negative
 C. Defined as zero
 D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

MCQ 0674 / 1000

674. A state function depends on? (Set 7)

- A. The specific path taken
 B. Initial and final states only
 C. Rate of reaction
 D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0675 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

675. At constant pressure, the heat change accompanying a reaction equals? (Set 7)

- A. Internal energy change ΔU B. Enthalpy change ΔH
C. Work done w D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0676 / 1000

16. Alcohols & Phenols

676. The first law of thermodynamics is expressed mathematically as? (Set 7)

- A. $\Delta U = q + w$ B. $\Delta H = q - w$
C. $PV = nRT$ D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0677 / 1000

17. Aldehydes & Ketones

677. Bond breaking is always an? (Set 7)

- A. Exothermic process B. Endothermic process
C. Isothermal process D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0678 / 1000

18. Carboxylic Acids & Derivatives

678. A reaction that absorbs heat from surroundings is described as? (Set 7)

- A. Exothermic B. Endothermic
C. Spontaneous always D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0679 / 1000

19. Macromolecules (Proteins & Enzymes)

679. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 7)

- A. 100°C B. 1 K or 1°C
C. 0.1 K D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0680 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

680. In a bomb calorimeter, heat change is measured at constant? (Set 7)

- A. Pressure B. Volume
C. Temperature D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0681 / 1000

1. Stoichiometry & Moles

681. In an electrochemical cell, oxidation always occurs at the? (Set 7)

- A. Cathode B. Anode
C. Salt bridge D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0682 / 1000

2. Atomic Structure & Quantum Theory

682. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 7)

- A. Heat energy only B. Electrical energy
C. Nuclear energy D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0683 / 1000

3. Gas Laws & Kinetic Molecular Theory

683. Reduction is defined as the? (Set 7)

- A. Loss of electrons B. Gain of electrons
C. Gain of oxygen D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0684 / 1000

4. Liquids & Hydrogen Bonding

684. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 7)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0685 / 1000

5. Solids & Lattice Energy

685. A salt bridge in a galvanic cell serves to? (Set 7)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0686 / 1000

6. Chemical Equilibrium & Le Chatelier

686. Standard cell EMF (E°_{cell}) is calculated as? (Set 7)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0687 / 1000

7. Reaction Kinetics & Activation Energy

687. A species with a highly negative standard reduction potential acts as a? (Set 7)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0688 / 1000

8. Thermochemistry & Energetics

688. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 7)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0689 / 1000

9. Electrochemistry & Redox

689. The oxidation number of sulfur in H_2SO_4 is? (Set 7)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0690 / 1000

10. Chemical Bonding, VSEPR & Hybridization

690. Corrosion of iron (rusting) is fundamentally an? (Set 7)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0691 / 1000

11. s- and p-Block Elements

691. According to VSEPR theory, CH_4 has what molecular geometry? (Set 7)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0692 / 1000

12. Transition Elements & Coordination

692. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 7)

- A. 3 lone pairs
B. Repulsion from 1 lone pair on nitrogen
C. 2 lone pairs
D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0693 / 1000

13. Fundamental Organic Chemistry & Isomerism

693. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 7)

- A. sp^3 B. sp^2
C. sp D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0694 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

694. A double covalent bond consists of? (Set 7)

- A. Two sigma bonds B. Two pi bonds
C. One sigma and one pi bond D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0695 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E1, E2)**695. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 7)**

- A. Tetrahedral B. Trigonal planar
C. Bent D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0696 / 1000

16. Alcohols & Phenols

696. A pi (π) bond is formed by? (Set 7)

- A. Head-on s-s overlap B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0697 / 1000

17. Aldehydes & Ketones

697. SF_6 central sulfur atom exhibits which hybridization and shape? (Set 7)

- A. sp^3 , Tetrahedral B. sp^3d^2 , Octahedral
C. sp^3d , Trigonal bipyramidal D. sp^2 , Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp^3d^2 octahedral.

MCQ 0698 / 1000

18. Carboxylic Acids & Derivatives

698. Bond energy generally increases as bond length? (Set 7)

- A. Increases B. Decreases
C. Remains constant D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0699 / 1000

19. Macromolecules (Proteins & Enzymes)

699. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 7)

- A. sp^3 B. sp^2
C. sp D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0700 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

700. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 7)

- A. No lone pairs B. 1 lone pair
C. 2 lone pairs on oxygen D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0701 / 1000

1. Stoichiometry & Moles

701. The number of particles present in 1 mole of any substance is called? (Set 8)

- A. Faraday constant B. Gas constant
C. Avogadro constant D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0702 / 1000

2. Atomic Structure & Quantum Theory

702. One mole of C₁₂H₂₂O₁₁ (sucrose) has a molar mass of? (Set 8)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ **Correct Answer: B**  **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0703 / 1000

3. Gas Laws & Kinetic Molecular Theory

703. To identify the limiting reagent, available moles of each reactant are compared with? (Set 8)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ **Correct Answer: D**  **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0704 / 1000

4. Liquids & Hydrogen Bonding

704. At STP, one mole of an ideal gas occupies a volume of? (Set 8)

- A. 11.2 dm³
B. 44.8 dm³
C. 24.0 dm³
D. 22.4 dm³

✓ **Correct Answer: D**  **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm³.

MCQ 0705 / 1000

5. Solids & Lattice Energy

705. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 8)

- A. 90%
B. 80%
C. 75%
D. 95%

✓ **Correct Answer: A**  **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0706 / 1000

6. Chemical Equilibrium & Le Chatelier

706. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H₂ and 1 mole of O₂ are reacted, the limiting reagent is? (Set 8)

- A. H₂
B. H₂O
C. O₂
D. Both equally

✓ **Correct Answer: C**  **Concept / Tip:** 1 mol O₂ requires 2 mol H₂. Excess H₂ remains, so O₂ is limiting.

MCQ 0707 / 1000

7. Reaction Kinetics & Activation Energy

707. The maximum amount of product predicted by stoichiometric calculations is? (Set 8)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ **Correct Answer: C**  **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0708 / 1000

8. Thermochemistry & Energetics

708. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 8)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ **Correct Answer: C**  **Concept / Tip:** $V \propto n$ at constant T and P.

MCQ 0709 / 1000

9. Electrochemistry & Redox

709. For an ionic compound, the representative particle is best termed a? (Set 8)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C**  **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0710 / 1000

10. Chemical Bonding, VSEPR & Hybridization

710. Mass of 0.5 mole of water (H₂O) is? (Set 8)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A**  **Concept / Tip:** Mass = $n \times M = 0.5 \times 18 = 9 \text{ g}$.

MCQ 0711 / 1000

11. s- and p-Block Elements

711. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 8)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D** 💡 **Concept / Tip:** l ranges from 0 to $(n - 1)$.

MCQ 0712 / 1000

12. Transition Elements & Coordination

712. The azimuthal quantum number (l) specifies the? (Set 8)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0713 / 1000

13. Fundamental Organic Chemistry & Isomerism

713. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 8)

- A. $[\text{Ar}] 3d^4 4s^2$
B. $[\text{Ar}] 3d^5 4s^1$
C. $[\text{Ar}] 3d^3 4s^3$
D. $[\text{Ar}] 3d^6 4s^0$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d^5 configuration imparts extra stability.

MCQ 0714 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

714. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 8)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0715 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E_1 , E_2)**715. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 8)**

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0716 / 1000

16. Alcohols & Phenols

716. The total number of orbitals present in the $n = 3$ shell is? (Set 8)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0717 / 1000

17. Aldehydes & Ketones

717. Positive rays (canal rays) were discovered by? (Set 8)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0718 / 1000

18. Carboxylic Acids & Derivatives

718. Hund's rule states that degenerate orbitals are occupied? (Set 8)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0719 / 1000

19. Macromolecules (Proteins & Enzymes)

719. An s orbital has what geometric shape? (Set 8)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

720. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 8)

- A. $n = 1$
C. $n = 3$
- B. $n = 2$
D. $n = 4$

✓ **Correct Answer: B** **Concept / Tip:** Balmer series lines fall in the visible spectrum.

1. Stoichiometry & Moles

721. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 8)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ Correct Answer: B  Concept / Tip: $P_1V_1 = P_2V_2$ at constant T and n.

2. Atomic Structure & Quantum Theory

722. Ideal gas behavior is best approached under which conditions? (Set 8)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

3. Gas Laws & Kinetic Molecular Theory

723. The SI unit of the universal gas constant R is? (Set 8)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$ B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$ D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ Correct Answer: B Concept / Tip: $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

4. Liquids & Hydrogen Bonding

724. Absolute zero corresponds to approximately? (Set 8)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C** **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

5. Solids & Lattice Energy

725. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 8)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ Correct Answer: C Concept / Tip: Rate $\propto 1 / \sqrt{(M)}$.

6. Chemical Equilibrium & Le Chatelier

726. Dalton's law applies to mixtures of gases that are? (Set 8)

- A. Reacting strongly B. Non-reacting
C. Polar only D. Liquefiable easily

✓ **Correct Answer: B** **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

7. Reaction Kinetics & Activation Energy

727. A gas occupies 3 dm³ at 150 K. At constant pressure, its volume at 300 K is? (Set 8)

- A. 1.5 dm^3
B. 6 dm^3
C. 9 dm^3
D. 12 dm^3

✓ **Correct Answer: B** **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$

8. Thermochemistry & Energetics

728. Real gases deviate from ideal gas behavior because real gas molecules? (Set 8)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B**  **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0729 / 1000

9. Electrochemistry & Redox

729. Average kinetic energy of gas molecules is directly proportional to? (Set 8)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C** 💡 **Concept / Tip:** $KE_{avg} = (3/2) RT$.

MCQ 0730 / 1000

10. Chemical Bonding, VSEPR & Hybridization

730. Under school-level traditional STP, traditional temperature and pressure are? (Set 8)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0731 / 1000

11. s- and p-Block Elements

731. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 8)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0732 / 1000

12. Transition Elements & Coordination

732. A liquid boils when its vapor pressure becomes equal to? (Set 8)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{vap} = P_{ext}$.

MCQ 0733 / 1000

13. Fundamental Organic Chemistry & Isomerism

733. Evaporation is a cooling process because escaping surface molecules have? (Set 8)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0734 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

734. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 8)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0735 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

735. Intermolecular forces in liquids are generally? (Set 8)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0736 / 1000

16. Alcohols & Phenols

736. Surface tension arises due to? (Set 8)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0737 / 1000

17. Aldehydes & Ketones

737. A volatile liquid generally possesses? (Set 8)

- A. Strong intermolecular forces and high boiling point
B. Weak intermolecular forces and high vapor pressure
C. High boiling point and low vapor pressure
D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

18. Carboxylic Acids & Derivatives

MCQ 0738 / 1000

738. Viscosity of a liquid generally decreases as temperature? (Set 8)

- A. Decreases
B. Increases
C. Remains constant
D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

19. Macromolecules (Proteins & Enzymes)

MCQ 0739 / 1000

739. Which liquid exhibits the strongest hydrogen bonding? (Set 8)

- A. CH₄
B. H₂S
C. H₂O
D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

MCQ 0740 / 1000

740. Capillary action of liquids is driven by the balance between? (Set 8)

- A. Gravity and mass
B. Adhesion and cohesion
C. Density and volume
D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

1. Stoichiometry & Moles

MCQ 0741 / 1000

741. A crystalline solid differs from an amorphous solid in possessing? (Set 8)

- A. Sharp melting point and long-range order
B. Gradual softening range
C. Isotropic properties only
D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

2. Atomic Structure & Quantum Theory

MCQ 0742 / 1000

742. Covalent network solids like diamond are characterized by? (Set 8)

- A. Low melting point
B. Extreme hardness and high melting point
C. High electrical conductivity as solid
D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

3. Gas Laws & Kinetic Molecular Theory

MCQ 0743 / 1000

743. Lattice energy is defined as energy released when? (Set 8)

- A. 1 mole of solid melts
B. Gaseous ions form 1 mole of ionic solid
C. Solid dissolves in water
D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

4. Liquids & Hydrogen Bonding

MCQ 0744 / 1000

744. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 8)

- A. Mg²⁺ and O²⁻ have higher ionic charges
B. Na⁺ is smaller than Mg²⁺
C. Cl⁻ is smaller than O²⁻
D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

5. Solids & Lattice Energy

MCQ 0745 / 1000

745. Ionic solids conduct electricity? (Set 8)

- A. In solid state only
B. When molten or in aqueous solution
C. Under no conditions
D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

6. Chemical Equilibrium & Le Chatelier

MCQ 0746 / 1000

746. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 8)

- A. Atom
B. Molecule
C. Unit cell
D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0747 / 1000

7. Reaction Kinetics & Activation Energy

747. Ionic crystals are brittle because shifting layers bring? (Set 8)

- A. Opposite charges together
 B. Like charges close together
 C. Electrons into nucleus
 D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0748 / 1000

8. Thermochemistry & Energetics

748. Molecular crystals like iodine (I₂) are held together by? (Set 8)

- A. Strong ionic bonds
 B. Metallic bonding
 C. Weak intermolecular forces (London forces)
 D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0749 / 1000

9. Electrochemistry & Redox

749. Anisotropy in crystalline solids means physical properties? (Set 8)

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0750 / 1000

10. Chemical Bonding, VSEPR & Hybridization

750. In NaCl crystal lattice, each Na⁺ ion is surrounded octahedrally by how many Cl⁻ ions? (Set 8)

- A. 4
 B. 6
 C. 8
 D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0751 / 1000

11. s- and p-Block Elements

751. Dynamic equilibrium in a reversible reaction is achieved when? (Set 8)

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0752 / 1000

12. Transition Elements & Coordination

752. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 8)

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

MCQ 0753 / 1000

13. Fundamental Organic Chemistry & Isomerism

753. Adding a catalyst to a reaction at equilibrium? (Set 8)

- A. Increases K_c
 B. Shifts position to products
 C. Speeds up attainment of equilibrium without shifting position
 D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0754 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

754. An acidic buffer solution can be prepared by mixing? (Set 8)

- A. Strong acid and strong base
 B. Weak acid and its conjugate base salt
 C. Weak base and strong base
 D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: CH₃COOH + CH₃COONa.

MCQ 0755 / 1000

15. Alkyl Halides (S_N1, S_N2, E1, E2)**755. For a sparingly soluble salt MX₂, the solubility product expression K_{sp} is? (Set 8)**

- A. [M²⁺][X⁻]
 B. [M²⁺][X⁻]²
 C. [M²⁺]²[X⁻]
 D. [MX₂]

✓ **Correct Answer: B** 💡 **Concept / Tip:** K_{sp} = [M²⁺][X⁻]² following stoichiometry.

MCQ 0756 / 1000

16. Alcohols & Phenols

756. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 8)

- A. Increase
B. Decrease
C. Remain unchanged
D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0757 / 1000

17. Aldehydes & Ketones

757. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 8)

- A. Products
B. Reactants
C. No shift
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0758 / 1000

18. Carboxylic Acids & Derivatives

758. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 8)

- A. Pressure
B. Concentration
C. Temperature
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0759 / 1000

19. Macromolecules (Proteins & Enzymes)

759. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 8)

- A. Only acid
B. Only base
C. Both acid and base
D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0760 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

760. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 8)

- A. Low pressure and high T
B. High pressure and low T
C. Low pressure and low T
D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0761 / 1000

1. Stoichiometry & Moles

761. The unit of rate constant (k) for a first-order reaction is? (Set 8)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
B. s^{-1}
C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0762 / 1000

2. Atomic Structure & Quantum Theory

762. A catalyst increases reaction rate primarily by? (Set 8)

- A. Increasing collision frequency only
B. Lowering activation energy barrier
C. Shifting equilibrium position
D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0763 / 1000

3. Gas Laws & Kinetic Molecular Theory

763. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 8)

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0764 / 1000

4. Liquids & Hydrogen Bonding

764. Activation energy (E_a) is best defined as? (Set 8)

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0765 / 1000

5. Solids & Lattice Energy

765. A zero-order reaction has a rate that is? (Set 8)

- A. Directly proportional to concentration
 B. Independent of reactant concentration
 C. Proportional to square of concentration
 D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rate = $k[A]^0 = k$.

MCQ 0766 / 1000

6. Chemical Equilibrium & Le Chatelier

766. Increasing surface area of a solid reactant increases reaction rate because? (Set 8)

- A. It lowers activation energy
 B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant
 D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0767 / 1000

7. Reaction Kinetics & Activation Energy

767. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 8)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0768 / 1000

8. Thermochemistry & Energetics

768. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 8)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0769 / 1000

9. Electrochemistry & Redox

769. Increasing temperature increases reaction rate mainly by? (Set 8)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0770 / 1000

10. Chemical Bonding, VSEPR & Hybridization

770. The activated complex (transition state) is? (Set 8)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0771 / 1000

11. s- and p-Block Elements

771. An exothermic reaction is characterized by? (Set 8)

- A. Positive ΔH
 B. Negative ΔH
 C. Zero ΔH
 D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0772 / 1000

12. Transition Elements & Coordination

772. Hess's law of constant heat summation is a direct application of conservation of? (Set 8)

- A. Mass
 B. Charge
 C. Energy
 D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0773 / 1000

13. Fundamental Organic Chemistry & Isomerism

773. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 8)

- A. Always positive
 B. Always negative
 C. Defined as zero
 D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0774 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

774. A state function depends on? (Set 8)

- A. The specific path taken
 B. Initial and final states only
 C. Rate of reaction
 D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0775 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

775. At constant pressure, the heat change accompanying a reaction equals? (Set 8)

- A. Internal energy change ΔU
 B. Enthalpy change ΔH
 C. Work done w
 D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $qp = \Delta H$ under constant pressure.

MCQ 0776 / 1000

16. Alcohols & Phenols

776. The first law of thermodynamics is expressed mathematically as? (Set 8)

- A. $\Delta U = q + w$
 B. $\Delta H = q - w$
 C. $PV = nRT$
 D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0777 / 1000

17. Aldehydes & Ketones

777. Bond breaking is always an? (Set 8)

- A. Exothermic process
 B. Endothermic process
 C. Isothermal process
 D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0778 / 1000

18. Carboxylic Acids & Derivatives

778. A reaction that absorbs heat from surroundings is described as? (Set 8)

- A. Exothermic
 B. Endothermic
 C. Spontaneous always
 D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0779 / 1000

19. Macromolecules (Proteins & Enzymes)

779. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 8)

- A. 100°C
 B. 1 K or 1°C
 C. 0.1 K
 D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0780 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

780. In a bomb calorimeter, heat change is measured at constant? (Set 8)

- A. Pressure
 B. Volume
 C. Temperature
 D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0781 / 1000

1. Stoichiometry & Moles

781. In an electrochemical cell, oxidation always occurs at the? (Set 8)

- A. Cathode
 B. Anode
 C. Salt bridge
 D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0782 / 1000

2. Atomic Structure & Quantum Theory

782. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 8)

- A. Heat energy only
 B. Electrical energy
 C. Nuclear energy
 D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0783 / 1000

3. Gas Laws & Kinetic Molecular Theory

783. Reduction is defined as the? (Set 8)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0784 / 1000

4. Liquids & Hydrogen Bonding

784. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 8)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0785 / 1000

5. Solids & Lattice Energy

785. A salt bridge in a galvanic cell serves to? (Set 8)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0786 / 1000

6. Chemical Equilibrium & Le Chatelier

786. Standard cell EMF (E°_{cell}) is calculated as? (Set 8)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red(cathode)}} - E^\circ_{\text{red(anode)}}$.

MCQ 0787 / 1000

7. Reaction Kinetics & Activation Energy

787. A species with a highly negative standard reduction potential acts as a? (Set 8)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0788 / 1000

8. Thermochemistry & Energetics

788. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 8)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0789 / 1000

9. Electrochemistry & Redox

789. The oxidation number of sulfur in H_2SO_4 is? (Set 8)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0790 / 1000

10. Chemical Bonding, VSEPR & Hybridization

790. Corrosion of iron (rusting) is fundamentally an? (Set 8)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0791 / 1000

11. s- and p-Block Elements

791. According to VSEPR theory, CH_4 has what molecular geometry? (Set 8)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0792 / 1000

12. Transition Elements & Coordination

792. The molecular shape of NH_3 is trigonal pyramidal rather than tetrahedral because of? (Set 8)

- A. 3 lone pairs
 B. Repulsion from 1 lone pair on nitrogen
 C. 2 lone pairs
 D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to $\sim 107^\circ$.

MCQ 0793 / 1000

13. Fundamental Organic Chemistry & Isomerism

793. Carbon atom in ethene ($\text{CH}_2=\text{CH}_2$) undergoes which type of hybridization? (Set 8)

- A. sp^3
 B. sp^2
 C. sp
 D. dsp^2

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp^2 hybridization with 120° planar geometry.

MCQ 0794 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

794. A double covalent bond consists of? (Set 8)

- A. Two sigma bonds
 B. Two pi bonds
 C. One sigma and one pi bond
 D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0795 / 1000

15. Alkyl Halides (SN_1 , SN_2 , E1, E2)**795. BF_3 molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 8)**

- A. Tetrahedral
 B. Trigonal planar
 C. Bent
 D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0796 / 1000

16. Alcohols & Phenols

796. A pi (π) bond is formed by? (Set 8)

- A. Head-on s-s overlap
 B. Sideways overlap of parallel p orbitals
 C. Head-on p-p overlap
 D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0797 / 1000

17. Aldehydes & Ketones

797. SF_6 central sulfur atom exhibits which hybridization and shape? (Set 8)

- A. sp^3 , Tetrahedral
 B. sp^3d^2 , Octahedral
 C. sp^3d , Trigonal bipyramidal
 D. sp^2 , Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp^3d^2 octahedral.

MCQ 0798 / 1000

18. Carboxylic Acids & Derivatives

798. Bond energy generally increases as bond length? (Set 8)

- A. Increases
 B. Decreases
 C. Remains constant
 D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0799 / 1000

19. Macromolecules (Proteins & Enzymes)

799. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 8)

- A. sp^3
 B. sp^2
 C. sp
 D. dsp^2

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0800 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

800. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 8)

- A. No lone pairs
 B. 1 lone pair
 C. 2 lone pairs on oxygen
 D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0801 / 1000

1. Stoichiometry & Moles

801. The number of particles present in 1 mole of any substance is called? (Set 9)

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ Correct Answer: C 💡 Concept / Tip: One mole contains 6.022×10^{23} representative particles.

MCQ 0802 / 1000

2. Atomic Structure & Quantum Theory

802. One mole of $C_{12}H_{22}O_{11}$ (sucrose) has a molar mass of? (Set 9)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ Correct Answer: B 💡 Concept / Tip: $12(12) + 22(1) + 11(16) = 342$ g/mol.

MCQ 0803 / 1000

3. Gas Laws & Kinetic Molecular Theory

803. To identify the limiting reagent, available moles of each reactant are compared with? (Set 9)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ Correct Answer: D 💡 Concept / Tip: Divide moles available by stoichiometric coefficient.

MCQ 0804 / 1000

4. Liquids & Hydrogen Bonding

804. At STP, one mole of an ideal gas occupies a volume of? (Set 9)

- A. 11.2 dm³
B. 44.8 dm³
C. 24.0 dm³
D. 22.4 dm³

✓ Correct Answer: D 💡 Concept / Tip: Standard molar volume at 0°C and 1 atm is 22.4 dm³.

MCQ 0805 / 1000

5. Solids & Lattice Energy

805. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 9)

- A. 90%
B. 80%
C. 75%
D. 95%

✓ Correct Answer: A 💡 Concept / Tip: Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0806 / 1000

6. Chemical Equilibrium & Le Chatelier

806. In $2H_2 + O_2 \rightarrow 2H_2O$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 9)

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ Correct Answer: C 💡 Concept / Tip: 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0807 / 1000

7. Reaction Kinetics & Activation Energy

807. The maximum amount of product predicted by stoichiometric calculations is? (Set 9)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ Correct Answer: C 💡 Concept / Tip: Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0808 / 1000

8. Thermochemistry & Energetics

808. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 9)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ Correct Answer: C 💡 Concept / Tip: $V \propto n$ at constant T and P.

MCQ 0809 / 1000

9. Electrochemistry & Redox

809. For an ionic compound, the representative particle is best termed as? (Set 9)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ Correct Answer: C 💡 Concept / Tip: Ionic lattices are described by formula units.

MCQ 0810 / 1000

10. Chemical Bonding, VSEPR & Hybridization

810. Mass of 0.5 mole of water (H₂O) is? (Set 9)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A**  **Concept / Tip:** Mass = $n \times M = 0.5 \times 18 = 9$ g.

MCQ 0811 / 1000

11. s- and p-Block Elements

811. For $n = 3$, the allowed values of the azimuthal quantum number (l) are? (Set 9)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D**  **Concept / Tip:** l ranges from 0 to $(n - 1)$.

MCQ 0812 / 1000

12. Transition Elements & Coordination

812. The azimuthal quantum number (l) specifies the? (Set 9)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B**  **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0813 / 1000

13. Fundamental Organic Chemistry & Isomerism

813. The ground-state electronic configuration of Chromium ($Z = 24$) is? (Set 9)

- A. [Ar] 3d⁴ 4s²
B. [Ar] 3d⁵ 4s¹
C. [Ar] 3d³ 4s³
D. [Ar] 3d⁶ 4s⁰

✓ **Correct Answer: B**  **Concept / Tip:** Half-filled d⁵ configuration imparts extra stability.

MCQ 0814 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

814. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 9)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C**  **Concept / Tip:** Lyman transitions end at $n = 1$ (UV region).

MCQ 0815 / 1000

15. Alkyl Halides (S_N1, S_N2, E1, E2)**815. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 9)**

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C**  **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0816 / 1000

16. Alcohols & Phenols

816. The total number of orbitals present in the $n = 3$ shell is? (Set 9)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C**  **Concept / Tip:** Total orbitals = $n^2 = 3^2 = 9$.

MCQ 0817 / 1000

17. Aldehydes & Ketones

817. Positive rays (canal rays) were discovered by? (Set 9)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B**  **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0818 / 1000

18. Carboxylic Acids & Derivatives

818. Hund's rule states that degenerate orbitals are occupied? (Set 9)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C**  **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0819 / 1000

19. Macromolecules (Proteins & Enzymes)

819. An s orbital has what geometric shape? (Set 9)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0820 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

820. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 9)

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0821 / 1000

1. Stoichiometry & Moles

821. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 9)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B** 💡 **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0822 / 1000

2. Atomic Structure & Quantum Theory

822. Ideal gas behavior is best approached under which conditions? (Set 9)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0823 / 1000

3. Gas Laws & Kinetic Molecular Theory

823. The SI unit of the universal gas constant R is? (Set 9)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0824 / 1000

4. Liquids & Hydrogen Bonding

824. Absolute zero corresponds to approximately? (Set 9)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C** 💡 **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0825 / 1000

5. Solids & Lattice Energy

825. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 9)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1 / \sqrt{M}$.

MCQ 0826 / 1000

6. Chemical Equilibrium & Le Chatelier

826. Dalton's law applies to mixtures of gases that are? (Set 9)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

MCQ 0827 / 1000

7. Reaction Kinetics & Activation Energy

827. A gas occupies 3 dm^3 at 150 K. At constant pressure, its volume at 300 K is? (Set 9)

- A. 1.5 dm^3
B. 6 dm^3
C. 9 dm^3
D. 12 dm^3

✓ **Correct Answer: B** 💡 **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

MCQ 0828 / 1000

8. Thermochemistry & Energetics

828. Real gases deviate from ideal gas behavior because real gas molecules? (Set 9)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

MCQ 0829 / 1000

9. Electrochemistry & Redox

829. Average kinetic energy of gas molecules is directly proportional to? (Set 9)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C** 💡 **Concept / Tip:** $KE_{avg} = (3/2) RT$.

MCQ 0830 / 1000

10. Chemical Bonding, VSEPR & Hybridization

830. Under school-level traditional STP, traditional temperature and pressure are? (Set 9)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B** 💡 **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

MCQ 0831 / 1000

11. s- and p-Block Elements

831. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 9)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

MCQ 0832 / 1000

12. Transition Elements & Coordination

832. A liquid boils when its vapor pressure becomes equal to? (Set 9)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Boiling occurs throughout the liquid when $P_{vap} = P_{ext}$.

MCQ 0833 / 1000

13. Fundamental Organic Chemistry & Isomerism

833. Evaporation is a cooling process because escaping surface molecules have? (Set 9)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

MCQ 0834 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

834. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 9)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

MCQ 0835 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

835. Intermolecular forces in liquids are generally? (Set 9)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** 💡 **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0836 / 1000

16. Alcohols & Phenols

836. Surface tension arises due to? (Set 9)

- A. Unbalanced inward cohesive forces at the surface
B. Equal forces in all directions
C. Gravitational force only
D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0837 / 1000

17. Aldehydes & Ketones

837. A volatile liquid generally possesses? (Set 9)

- A. Strong intermolecular forces and high boiling point
 B. Weak intermolecular forces and high vapor pressure
 C. High boiling point and low vapor pressure
 D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0838 / 1000

18. Carboxylic Acids & Derivatives

838. Viscosity of a liquid generally decreases as temperature? (Set 9)

- A. Decreases
 B. Increases
 C. Remains constant
 D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0839 / 1000

19. Macromolecules (Proteins & Enzymes)

839. Which liquid exhibits the strongest hydrogen bonding? (Set 9)

- A. CH₄
 B. H₂S
 C. H₂O
 D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0840 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

840. Capillary action of liquids is driven by the balance between? (Set 9)

- A. Gravity and mass
 B. Adhesion and cohesion
 C. Density and volume
 D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0841 / 1000

1. Stoichiometry & Moles

841. A crystalline solid differs from an amorphous solid in possessing? (Set 9)

- A. Sharp melting point and long-range order
 B. Gradual softening range
 C. Isotropic properties only
 D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0842 / 1000

2. Atomic Structure & Quantum Theory

842. Covalent network solids like diamond are characterized by? (Set 9)

- A. Low melting point
 B. Extreme hardness and high melting point
 C. High electrical conductivity as solid
 D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0843 / 1000

3. Gas Laws & Kinetic Molecular Theory

843. Lattice energy is defined as energy released when? (Set 9)

- A. 1 mole of solid melts
 B. Gaseous ions form 1 mole of ionic solid
 C. Solid dissolves in water
 D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0844 / 1000

4. Liquids & Hydrogen Bonding

844. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 9)

- A. Mg²⁺ and O²⁻ have higher ionic charges
 B. Na⁺ is smaller than Mg²⁺
 C. Cl⁻ is smaller than O²⁻
 D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0845 / 1000

5. Solids & Lattice Energy

845. Ionic solids conduct electricity? (Set 9)

- A. In solid state only
 B. When molten or in aqueous solution
 C. Under no conditions
 D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

6. Chemical Equilibrium & Le Chatelier

MCQ 0846 / 1000

846. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 9)

- A. Atom
B. Molecule
C. Unit cell
D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

7. Reaction Kinetics & Activation Energy

MCQ 0847 / 1000

847. Ionic crystals are brittle because shifting layers bring? (Set 9)

- A. Opposite charges together
B. Like charges close together
C. Electrons into nucleus
D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

8. Thermochemistry & Energetics

MCQ 0848 / 1000

848. Molecular crystals like iodine (I₂) are held together by? (Set 9)

- A. Strong ionic bonds
B. Metallic bonding
C. Weak intermolecular forces (London forces)
D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

9. Electrochemistry & Redox

MCQ 0849 / 1000

849. Anisotropy in crystalline solids means physical properties? (Set 9)

- A. Are identical in all directions
B. Vary depending on directional orientation
C. Are zero in all directions
D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0850 / 1000

850. In NaCl crystal lattice, each Na⁺ ion is surrounded octahedrally by how many Cl⁻ ions? (Set 9)

- A. 4
B. 6
C. 8
D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

11. s- and p-Block Elements

MCQ 0851 / 1000

851. Dynamic equilibrium in a reversible reaction is achieved when? (Set 9)

- A. Forward reaction stops
B. Forward and reverse reaction rates become equal
C. Concentrations of reactants reach zero
D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

12. Transition Elements & Coordination

MCQ 0852 / 1000

852. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 9)

- A. Reactants
B. Products
C. Neither side
D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

13. Fundamental Organic Chemistry & Isomerism

MCQ 0853 / 1000

853. Adding a catalyst to a reaction at equilibrium? (Set 9)

- A. Increases K_c
B. Shifts position to products
C. Speeds up attainment of equilibrium without shifting position
D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

MCQ 0854 / 1000

854. An acidic buffer solution can be prepared by mixing? (Set 9)

- A. Strong acid and strong base
B. Weak acid and its conjugate base salt
C. Weak base and strong base
D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: CH₃COOH + CH₃COONa.

MCQ 0855 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

855. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 9)

- A. $[\text{M}^{2+}][\text{X}^-]$ B. $[\text{M}^{2+}][\text{X}^-]^2$
 C. $[\text{M}^{2+}]^2[\text{X}^-]$ D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{sp} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0856 / 1000

16. Alcohols & Phenols

856. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 9)

- A. Increase B. Decrease
 C. Remain unchanged D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0857 / 1000

17. Aldehydes & Ketones

857. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 9)

- A. Products B. Reactants
 C. No shift D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0858 / 1000

18. Carboxylic Acids & Derivatives

858. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 9)

- A. Pressure B. Concentration
 C. Temperature D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0859 / 1000

19. Macromolecules (Proteins & Enzymes)

859. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 9)

- A. Only acid B. Only base
 C. Both acid and base D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0860 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

860. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 9)

- A. Low pressure and high T B. High pressure and low T
 C. Low pressure and low T D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0861 / 1000

1. Stoichiometry & Moles

861. The unit of rate constant (k) for a first-order reaction is? (Set 9)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$ B. s^{-1}
 C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$ D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0862 / 1000

2. Atomic Structure & Quantum Theory

862. A catalyst increases reaction rate primarily by? (Set 9)

- A. Increasing collision frequency only B. Lowering activation energy barrier
 C. Shifting equilibrium position D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0863 / 1000

3. Gas Laws & Kinetic Molecular Theory

863. If doubling $[\text{A}]$ quadruples the rate of reaction, the order with respect to A is? (Set 9)

- A. Zero order B. First order
 C. Second order D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [\text{A}]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0864 / 1000

4. Liquids & Hydrogen Bonding

864. Activation energy (E_a) is best defined as? (Set 9)

- A. Energy difference between reactants and products
 B. Minimum energy required to form activated complex
 C. Total heat released
 D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0865 / 1000

5. Solids & Lattice Energy

865. A zero-order reaction has a rate that is? (Set 9)

- A. Directly proportional to concentration
 B. Independent of reactant concentration
 C. Proportional to square of concentration
 D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rate = $k[A]^0 = k$.

MCQ 0866 / 1000

6. Chemical Equilibrium & Le Chatelier

866. Increasing surface area of a solid reactant increases reaction rate because? (Set 9)

- A. It lowers activation energy
 B. It increases exposed surface for effective collisions
 C. It changes equilibrium constant
 D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0867 / 1000

7. Reaction Kinetics & Activation Energy

867. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 9)

- A. Directly proportional to initial concentration
 B. Inversely proportional to initial concentration
 C. Independent of initial concentration
 D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0868 / 1000

8. Thermochemistry & Energetics

868. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 9)

- A. Fast step
 B. Rate-determining step
 C. Equilibrium step
 D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0869 / 1000

9. Electrochemistry & Redox

869. Increasing temperature increases reaction rate mainly by? (Set 9)

- A. Decreasing reactant mass
 B. Increasing fraction of molecules exceeding activation energy
 C. Eliminating activation energy
 D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0870 / 1000

10. Chemical Bonding, VSEPR & Hybridization

870. The activated complex (transition state) is? (Set 9)

- A. A stable intermediate
 B. A high-energy, unstable temporary arrangement
 C. The final product
 D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0871 / 1000

11. s- and p-Block Elements

871. An exothermic reaction is characterized by? (Set 9)

- A. Positive ΔH
 B. Negative ΔH
 C. Zero ΔH
 D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0872 / 1000

12. Transition Elements & Coordination

872. Hess's law of constant heat summation is a direct application of conservation of? (Set 9)

- A. Mass
 B. Charge
 C. Energy
 D. Momentum

✓ **Correct Answer: C** 💡 **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0873 / 1000

13. Fundamental Organic Chemistry & Isomerism

873. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 9)

- A. Always positive
B. Always negative
C. Defined as zero
D. 100 kJ/mol

✓ **Correct Answer: C** 💡 **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0874 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

874. A state function depends on? (Set 9)

- A. The specific path taken
B. Initial and final states only
C. Rate of reaction
D. Catalyst used

✓ **Correct Answer: B** 💡 **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0875 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

875. At constant pressure, the heat change accompanying a reaction equals? (Set 9)

- A. Internal energy change ΔU
B. Enthalpy change ΔH
C. Work done w
D. Equilibrium constant K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0876 / 1000

16. Alcohols & Phenols

876. The first law of thermodynamics is expressed mathematically as? (Set 9)

- A. $\Delta U = q + w$
B. $\Delta H = q - w$
C. $PV = nRT$
D. $q = m c \Delta T$

✓ **Correct Answer: A** 💡 **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0877 / 1000

17. Aldehydes & Ketones

877. Bond breaking is always an? (Set 9)

- A. Exothermic process
B. Endothermic process
C. Isothermal process
D. Energy-neutral process

✓ **Correct Answer: B** 💡 **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0878 / 1000

18. Carboxylic Acids & Derivatives

878. A reaction that absorbs heat from surroundings is described as? (Set 9)

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B** 💡 **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0879 / 1000

19. Macromolecules (Proteins & Enzymes)

879. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 9)

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** $C = q / \Delta T$.

MCQ 0880 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

880. In a bomb calorimeter, heat change is measured at constant? (Set 9)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0881 / 1000

1. Stoichiometry & Moles

881. In an electrochemical cell, oxidation always occurs at the? (Set 9)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B** 💡 **Concept / Tip:** AnOx: Anode = Oxidation.

2. Atomic Structure & Quantum Theory

MCQ 0882 / 1000

882. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 9)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** Spontaneous redox reaction drives electron flow.

3. Gas Laws & Kinetic Molecular Theory

MCQ 0883 / 1000

883. Reduction is defined as the? (Set 9)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B** 💡 **Concept / Tip:** RIG: Reduction Is Gain of electrons.

4. Liquids & Hydrogen Bonding

MCQ 0884 / 1000

884. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 9)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C** 💡 **Concept / Tip:** SHE serves as the universal zero potential reference.

5. Solids & Lattice Energy

MCQ 0885 / 1000

885. A salt bridge in a galvanic cell serves to? (Set 9)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B** 💡 **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

6. Chemical Equilibrium & Le Chatelier

MCQ 0886 / 1000

886. Standard cell EMF (E°_{cell}) is calculated as? (Set 9)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red}}(\text{cathode}) - E^\circ_{\text{red}}(\text{anode})$.

7. Reaction Kinetics & Activation Energy

MCQ 0887 / 1000

887. A species with a highly negative standard reduction potential acts as a? (Set 9)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B** 💡 **Concept / Tip:** Readily loses electrons (easily oxidized).

8. Thermochemistry & Energetics

MCQ 0888 / 1000

888. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 9)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

9. Electrochemistry & Redox

MCQ 0889 / 1000

889. The oxidation number of sulfur in H_2SO_4 is? (Set 9)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C** 💡 **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

10. Chemical Bonding, VSEPR & Hybridization

MCQ 0890 / 1000

890. Corrosion of iron (rusting) is fundamentally an? (Set 9)

- A. Acid-base reaction
B. Electrochemical (redox) process
C. Elimination reaction
D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0891 / 1000

11. s- and p-Block Elements

891. According to VSEPR theory, CH₄ has what molecular geometry? (Set 9)

- A. Linear
B. Trigonal planar
C. Tetrahedral
D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0892 / 1000

12. Transition Elements & Coordination

892. The molecular shape of NH₃ is trigonal pyramidal rather than tetrahedral because of? (Set 9)

- A. 3 lone pairs
B. Repulsion from 1 lone pair on nitrogen
C. 2 lone pairs
D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to ~107°.

MCQ 0893 / 1000

13. Fundamental Organic Chemistry & Isomerism

893. Carbon atom in ethene (CH₂=CH₂) undergoes which type of hybridization? (Set 9)

- A. sp³
B. sp²
C. sp
D. dsp²

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp² hybridization with 120° planar geometry.

MCQ 0894 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

894. A double covalent bond consists of? (Set 9)

- A. Two sigma bonds
B. Two pi bonds
C. One sigma and one pi bond
D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0895 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

895. BF₃ molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 9)

- A. Tetrahedral
B. Trigonal planar
C. Bent
D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0896 / 1000

16. Alcohols & Phenols

896. A pi (π) bond is formed by? (Set 9)

- A. Head-on s-s overlap
B. Sideways overlap of parallel p orbitals
C. Head-on p-p overlap
D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0897 / 1000

17. Aldehydes & Ketones

897. SF₆ central sulfur atom exhibits which hybridization and shape? (Set 9)

- A. sp³, Tetrahedral
B. sp³d², Octahedral
C. sp³d, Trigonal bipyramidal
D. sp², Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp³d² octahedral.

MCQ 0898 / 1000

18. Carboxylic Acids & Derivatives

898. Bond energy generally increases as bond length? (Set 9)

- A. Increases
B. Decreases
C. Remains constant
D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

MCQ 0899 / 1000

19. Macromolecules (Proteins & Enzymes)

899. Hybridization of central carbon in ethyne (HC≡CH) is? (Set 9)

- A. sp³
B. sp²
C. sp
D. dsp²

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

MCQ 0900 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

900. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 9)

- A. No lone pairs
B. 1 lone pair
C. 2 lone pairs on oxygen
D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.

MCQ 0901 / 1000

1. Stoichiometry & Moles

901. The number of particles present in 1 mole of any substance is called? (Set 10)

- A. Faraday constant
B. Gas constant
C. Avogadro constant
D. Planck constant

✓ **Correct Answer: C** 💡 **Concept / Tip:** One mole contains 6.022×10^{23} representative particles.

MCQ 0902 / 1000

2. Atomic Structure & Quantum Theory

902. One mole of $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sucrose) has a molar mass of? (Set 10)

- A. 180 g
B. 342 g
C. 360 g
D. 324 g

✓ **Correct Answer: B** 💡 **Concept / Tip:** $12(12) + 22(1) + 11(16) = 342 \text{ g/mol}$.

MCQ 0903 / 1000

3. Gas Laws & Kinetic Molecular Theory

903. To identify the limiting reagent, available moles of each reactant are compared with? (Set 10)

- A. Boiling point
B. Molar mass only
C. Physical state
D. Stoichiometric coefficient requirement

✓ **Correct Answer: D** 💡 **Concept / Tip:** Divide moles available by stoichiometric coefficient.

MCQ 0904 / 1000

4. Liquids & Hydrogen Bonding

904. At STP, one mole of an ideal gas occupies a volume of? (Set 10)

- A. 11.2 dm^3
B. 44.8 dm^3
C. 24.0 dm^3
D. 22.4 dm^3

✓ **Correct Answer: D** 💡 **Concept / Tip:** Standard molar volume at 0°C and 1 atm is 22.4 dm^3 .

MCQ 0905 / 1000

5. Solids & Lattice Energy

905. Actual yield is 36 g and theoretical yield is 40 g. What is the percentage yield? (Set 10)

- A. 90%
B. 80%
C. 75%
D. 95%

✓ **Correct Answer: A** 💡 **Concept / Tip:** Percentage yield = $(36 / 40) \times 100 = 90\%$.

MCQ 0906 / 1000

6. Chemical Equilibrium & Le Chatelier

906. In $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, if 4 moles of H_2 and 1 mole of O_2 are reacted, the limiting reagent is? (Set 10)

- A. H_2
B. H_2O
C. O_2
D. Both equally

✓ **Correct Answer: C** 💡 **Concept / Tip:** 1 mol O_2 requires 2 mol H_2 . Excess H_2 remains, so O_2 is limiting.

MCQ 0907 / 1000

7. Reaction Kinetics & Activation Energy

907. The maximum amount of product predicted by stoichiometric calculations is? (Set 10)

- A. Actual yield
B. Percent yield
C. Theoretical yield
D. Experimental yield

✓ **Correct Answer: C** 💡 **Concept / Tip:** Theoretical yield assumes complete conversion of limiting reagent.

MCQ 0908 / 1000

8. Thermochemistry & Energetics

908. Equal volumes of all gases at the same temperature and pressure contain equal number of molecules according to? (Set 10)

- A. Boyle's law
B. Charles's law
C. Avogadro's law
D. Graham's law

✓ **Correct Answer: C** 💡 **Concept / Tip:** $V \propto n$ at constant T and P.

MCQ 0909 / 1000

9. Electrochemistry & Redox

909. For an ionic compound, the representative particle is best termed a? (Set 10)

- A. Molecule
B. Atom
C. Formula unit
D. Ion pair

✓ **Correct Answer: C** 💡 **Concept / Tip:** Ionic lattices are described by formula units.

MCQ 0910 / 1000

10. Chemical Bonding, VSEPR & Hybridization

910. Mass of 0.5 mole of water (H₂O) is? (Set 10)

- A. 9 g
B. 18 g
C. 36 g
D. 4.5 g

✓ **Correct Answer: A** 💡 **Concept / Tip:** Mass = n × M = 0.5 × 18 = 9 g.

MCQ 0911 / 1000

11. s- and p-Block Elements

911. For n = 3, the allowed values of the azimuthal quantum number (l) are? (Set 10)

- A. 0, 1
B. 1, 2, 3
C. 0, 1, 2, 3
D. 0, 1, 2

✓ **Correct Answer: D** 💡 **Concept / Tip:** l ranges from 0 to (n - 1).

MCQ 0912 / 1000

12. Transition Elements & Coordination

912. The azimuthal quantum number (l) specifies the? (Set 10)

- A. Main energy level
B. Shape of the subshell
C. Orientation of orbital
D. Spin direction

✓ **Correct Answer: B** 💡 **Concept / Tip:** s is spherical, p is dumbbell, d is cloverleaf.

MCQ 0913 / 1000

13. Fundamental Organic Chemistry & Isomerism

913. The ground-state electronic configuration of Chromium (Z = 24) is? (Set 10)

- A. [Ar] 3d⁴ 4s²
B. [Ar] 3d⁵ 4s¹
C. [Ar] 3d³ 4s³
D. [Ar] 3d⁶ 4s⁰

✓ **Correct Answer: B** 💡 **Concept / Tip:** Half-filled d⁵ configuration imparts extra stability.

MCQ 0914 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

914. The Lyman series in the hydrogen spectrum lies in which electromagnetic region? (Set 10)

- A. Infrared
B. Visible
C. Ultraviolet
D. Far Infrared

✓ **Correct Answer: C** 💡 **Concept / Tip:** Lyman transitions end at n = 1 (UV region).

MCQ 0915 / 1000

15. Alkyl Halides (S_N1, S_N2, E1, E2)**915. According to Pauli's exclusion principle, an orbital can hold a maximum of two electrons with? (Set 10)**

- A. Parallel spins
B. Same quantum numbers
C. Opposite spins
D. Zero spin

✓ **Correct Answer: C** 💡 **Concept / Tip:** No two electrons share all 4 quantum numbers.

MCQ 0916 / 1000

16. Alcohols & Phenols

916. The total number of orbitals present in the n = 3 shell is? (Set 10)

- A. 3
B. 6
C. 9
D. 18

✓ **Correct Answer: C** 💡 **Concept / Tip:** Total orbitals = n² = 3² = 9.

MCQ 0917 / 1000

17. Aldehydes & Ketones

917. Positive rays (canal rays) were discovered by? (Set 10)

- A. J.J. Thomson
B. Eugen Goldstein
C. James Chadwick
D. Ernest Rutherford

✓ **Correct Answer: B** 💡 **Concept / Tip:** Goldstein observed canal rays in a perforated cathode tube.

MCQ 0918 / 1000

18. Carboxylic Acids & Derivatives

918. Hund's rule states that degenerate orbitals are occupied? (Set 10)

- A. Randomly
B. Paired immediately
C. Singly first with parallel spins
D. In pairs with opposite spins

✓ **Correct Answer: C** 💡 **Concept / Tip:** Maximizes total electron spin before pairing.

MCQ 0919 / 1000

19. Macromolecules (Proteins & Enzymes)

919. An s orbital has what geometric shape? (Set 10)

- A. Dumbbell
B. Double dumbbell
C. Spherical
D. Linear

✓ **Correct Answer: C** 💡 **Concept / Tip:** s orbitals are spherically symmetric.

MCQ 0920 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

920. The Balmer series of the hydrogen spectrum corresponds to electronic transitions ending at? (Set 10)

- A. $n = 1$
B. $n = 2$
C. $n = 3$
D. $n = 4$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Balmer series lines fall in the visible spectrum.

MCQ 0921 / 1000

1. Stoichiometry & Moles

921. At constant temperature, the volume of a gas is inversely proportional to pressure according to? (Set 10)

- A. Charles's law
B. Boyle's law
C. Avogadro's law
D. Dalton's law

✓ **Correct Answer: B** 💡 **Concept / Tip:** $P_1V_1 = P_2V_2$ at constant T and n.

MCQ 0922 / 1000

2. Atomic Structure & Quantum Theory

922. Ideal gas behavior is best approached under which conditions? (Set 10)

- A. High P and Low T
B. Low P and High T
C. High P and High T
D. Low P and Low T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Low P minimizes volume, High T overcomes intermolecular forces.

MCQ 0923 / 1000

3. Gas Laws & Kinetic Molecular Theory

923. The SI unit of the universal gas constant R is? (Set 10)

- A. $\text{dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$
B. $\text{J K}^{-1} \text{ mol}^{-1}$
C. $\text{cal K}^{-1} \text{ mol}^{-1}$
D. $\text{L mmHg K}^{-1} \text{ mol}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ in SI units.

MCQ 0924 / 1000

4. Liquids & Hydrogen Bonding

924. Absolute zero corresponds to approximately? (Set 10)

- A. 0°C
B. 100°C
C. -273°C
D. -100°C

✓ **Correct Answer: C** 💡 **Concept / Tip:** Absolute zero is 0 K or -273.15°C .

MCQ 0925 / 1000

5. Solids & Lattice Energy

925. Graham's law of diffusion states that rate of diffusion is inversely proportional to square root of? (Set 10)

- A. Temperature
B. Pressure
C. Molar mass or density
D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** $\text{Rate} \propto 1/\sqrt{M}$.

MCQ 0926 / 1000

6. Chemical Equilibrium & Le Chatelier

926. Dalton's law applies to mixtures of gases that are? (Set 10)

- A. Reacting strongly
B. Non-reacting
C. Polar only
D. Liquefiable easily

✓ **Correct Answer: B** 💡 **Concept / Tip:** Total pressure equals the sum of individual partial pressures.

7. Reaction Kinetics & Activation Energy

927. A gas occupies 3 dm³ at 150 K. At constant pressure, its volume at 300 K is? (Set 10)

- A. 1.5 dm³
B. 6 dm³
C. 9 dm³
D. 12 dm³

✓ **Correct Answer: B** **Concept / Tip:** $V_1/T_1 = V_2/T_2 \rightarrow 3/150 = V_2/300 \rightarrow V_2 = 6 \text{ dm}^3$.

8. Thermochemistry & Energetics

928. Real gases deviate from ideal gas behavior because real gas molecules? (Set 10)

- A. Have no mass
B. Have finite volume and attractions
C. Do not collide
D. Have zero kinetic energy

✓ **Correct Answer: B** 💡 **Concept / Tip:** van der Waals equation accounts for 'a' and 'b' parameters.

9. Electrochemistry & Redox

929. Average kinetic energy of gas molecules is directly proportional to? (Set 10)

- A. Volume
B. Pressure
C. Absolute temperature
D. Molar mass

✓ **Correct Answer: C** **Concept / Tip:** $KE_{avg} = (3/2) RT$.

10. Chemical Bonding, VSEPR & Hybridization

930. Under school-level traditional STP, traditional temperature and pressure are? (Set 10)

- A. 298 K, 1 atm
B. 273 K, 1 atm
C. 0 K, 1 atm
D. 373 K, 1 atm

✓ **Correct Answer: B**  **Concept / Tip:** STP is 0°C (273 K) and 1 atm (760 mmHg).

11. s- and p-Block Elements

931. The anomalous behavior of water (maximum density at 4°C) is due to? (Set 10)

- A. Ionic bonding
B. Covalent bonding
C. Open hydrogen-bonded structure
D. Metallic bonding

✓ **Correct Answer: C** **Concept / Tip:** Ice has an open hexagonal hydrogen-bonded framework.

12. Transition Elements & Coordination

932. A liquid boils when its vapor pressure becomes equal to? (Set 10)

- A. Internal pressure
B. External atmospheric pressure
C. Zero pressure
D. Critical pressure

✓ **Correct Answer: B** **Concept / Tip:** Boiling occurs throughout the liquid when $P_{\text{vap}} = P_{\text{ext}}$.

13. Fundamental Organic Chemistry & Isomerism

933. Evaporation is a cooling process because escaping surface molecules have? (Set 10)

- A. Lowest kinetic energy
B. Highest kinetic energy
C. Zero energy
D. Constant energy

✓ **Correct Answer: B** **Concept / Tip:** High KE molecules escape, leaving lower average KE behind.

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

934. Strong hydrogen bonding requires hydrogen attached to highly electronegative atoms such as? (Set 10)

- A. C, Si, P
B. N, O, F
C. Na, K, Ca
D. Cl, Br, I

✓ **Correct Answer: B** 💡 **Concept / Tip:** N-H, O-H, and F-H form strong polar dipole bonds.

15. Alkyl Halides (SN1, SN2, E1, E2)

935. Intermolecular forces in liquids are generally? (Set 10)

- A. Stronger than in gases
B. Weaker than in gases
C. Equal to gases
D. Zero

✓ **Correct Answer: A** **Concept / Tip:** Particles are much closer in liquids than in gases.

MCQ 0936 / 1000

16. Alcohols & Phenols

936. Surface tension arises due to? (Set 10)

- A. Unbalanced inward cohesive forces at the surface
 B. Equal forces in all directions
 C. Gravitational force only
 D. Absence of attractions

✓ **Correct Answer: A** 💡 **Concept / Tip:** Surface molecules experience net downward attraction.

MCQ 0937 / 1000

17. Aldehydes & Ketones

937. A volatile liquid generally possesses? (Set 10)

- A. Strong intermolecular forces and high boiling point
 B. Weak intermolecular forces and high vapor pressure
 C. High boiling point and low vapor pressure
 D. Zero vapor pressure

✓ **Correct Answer: B** 💡 **Concept / Tip:** Weak attractions allow rapid evaporation.

MCQ 0938 / 1000

18. Carboxylic Acids & Derivatives

938. Viscosity of a liquid generally decreases as temperature? (Set 10)

- A. Decreases
 B. Increases
 C. Remains constant
 D. Reaches 0 K

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher temperature increases kinetic energy, weakening attractive drag.

MCQ 0939 / 1000

19. Macromolecules (Proteins & Enzymes)

939. Which liquid exhibits the strongest hydrogen bonding? (Set 10)

- A. CH₄
 B. H₂S
 C. H₂O
 D. HCl

✓ **Correct Answer: C** 💡 **Concept / Tip:** H₂O forms an extensive 3D hydrogen-bonding network.

MCQ 0940 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

940. Capillary action of liquids is driven by the balance between? (Set 10)

- A. Gravity and mass
 B. Adhesion and cohesion
 C. Density and volume
 D. Pressure and temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adhesion to container walls vs cohesion within liquid.

MCQ 0941 / 1000

1. Stoichiometry & Moles

941. A crystalline solid differs from an amorphous solid in possessing? (Set 10)

- A. Sharp melting point and long-range order
 B. Gradual softening range
 C. Isotropic properties only
 D. Random arrangement

✓ **Correct Answer: A** 💡 **Concept / Tip:** Crystalline solids have long-range periodic order.

MCQ 0942 / 1000

2. Atomic Structure & Quantum Theory

942. Covalent network solids like diamond are characterized by? (Set 10)

- A. Low melting point
 B. Extreme hardness and high melting point
 C. High electrical conductivity as solid
 D. Weak van der Waals forces

✓ **Correct Answer: B** 💡 **Concept / Tip:** Held together by continuous 3D covalent bonds.

MCQ 0943 / 1000

3. Gas Laws & Kinetic Molecular Theory

943. Lattice energy is defined as energy released when? (Set 10)

- A. 1 mole of solid melts
 B. Gaseous ions form 1 mole of ionic solid
 C. Solid dissolves in water
 D. A covalent bond forms

✓ **Correct Answer: B** 💡 **Concept / Tip:** $M^+(g) + X^-(g) \rightarrow MX(s) + \Delta H_{\text{lattice}}$.

MCQ 0944 / 1000

4. Liquids & Hydrogen Bonding

944. Comparing NaCl and MgO, MgO has a much higher lattice energy because? (Set 10)

- A. Mg²⁺ and O²⁻ have higher ionic charges
 B. Na⁺ is smaller than Mg²⁺
 C. Cl⁻ is smaller than O²⁻
 D. NaCl is covalent

✓ **Correct Answer: A** 💡 **Concept / Tip:** Lattice energy increases with charge product ($z^+ \times z^-$).

MCQ 0945 / 1000

5. Solids & Lattice Energy

945. Ionic solids conduct electricity? (Set 10)

- A. In solid state only
 B. When molten or in aqueous solution
 C. Under no conditions
 D. In nonpolar solvents

✓ **Correct Answer: B** 💡 **Concept / Tip:** Ions become mobile in liquid/solution phase.

MCQ 0946 / 1000

6. Chemical Equilibrium & Le Chatelier

946. The smallest repeating structural unit that exhibits full symmetry of a crystal is the? (Set 10)

- A. Atom
 B. Molecule
 C. Unit cell
 D. Lattice point

✓ **Correct Answer: C** 💡 **Concept / Tip:** Unit cells repeat in 3D to construct the lattice.

MCQ 0947 / 1000

7. Reaction Kinetics & Activation Energy

947. Ionic crystals are brittle because shifting layers bring? (Set 10)

- A. Opposite charges together
 B. Like charges close together
 C. Electrons into nucleus
 D. Neutral molecules together

✓ **Correct Answer: B** 💡 **Concept / Tip:** Repulsion between like charges causes cleavage fracture.

MCQ 0948 / 1000

8. Thermochemistry & Energetics

948. Molecular crystals like iodine (I₂) are held together by? (Set 10)

- A. Strong ionic bonds
 B. Metallic bonding
 C. Weak intermolecular forces (London forces)
 D. Covalent network bonds

✓ **Correct Answer: C** 💡 **Concept / Tip:** Molecules occupy lattice sites with weak attraction.

MCQ 0949 / 1000

9. Electrochemistry & Redox

949. Anisotropy in crystalline solids means physical properties? (Set 10)

- A. Are identical in all directions
 B. Vary depending on directional orientation
 C. Are zero in all directions
 D. Depend on color

✓ **Correct Answer: B** 💡 **Concept / Tip:** Regular orientation causes direction-dependent properties.

MCQ 0950 / 1000

10. Chemical Bonding, VSEPR & Hybridization

950. In NaCl crystal lattice, each Na⁺ ion is surrounded octahedrally by how many Cl⁻ ions? (Set 10)

- A. 4
 B. 6
 C. 8
 D. 12

✓ **Correct Answer: B** 💡 **Concept / Tip:** NaCl exhibits 6:6 coordination number.

MCQ 0951 / 1000

11. s- and p-Block Elements

951. Dynamic equilibrium in a reversible reaction is achieved when? (Set 10)

- A. Forward reaction stops
 B. Forward and reverse reaction rates become equal
 C. Concentrations of reactants reach zero
 D. Reaction goes to completion

✓ **Correct Answer: B** 💡 **Concept / Tip:** Macroscopic properties remain constant as forward and reverse rates match.

MCQ 0952 / 1000

12. Transition Elements & Coordination

952. Increasing pressure on gaseous equilibrium $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$ shifts it toward? (Set 10)

- A. Reactants
 B. Products
 C. Neither side
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Higher pressure shifts equilibrium toward fewer gas moles (3 → 2).

MCQ 0953 / 1000

13. Fundamental Organic Chemistry & Isomerism

953. Adding a catalyst to a reaction at equilibrium? (Set 10)

- A. Increases K_c
 B. Shifts position to products
 C. Speeds up attainment of equilibrium without shifting position
 D. Stops reverse reaction

✓ **Correct Answer: C** 💡 **Concept / Tip:** A catalyst lowers activation energy for both forward and reverse paths equally.

MCQ 0954 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

954. An acidic buffer solution can be prepared by mixing? (Set 10)

- A. Strong acid and strong base
 B. Weak acid and its conjugate base salt
 C. Weak base and strong base
 D. Two strong acids

✓ **Correct Answer: B** 💡 **Concept / Tip:** Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.

MCQ 0955 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

955. For a sparingly soluble salt MX_2 , the solubility product expression K_{sp} is? (Set 10)

- A. $[\text{M}^{2+}][\text{X}^-]$
 B. $[\text{M}^{2+}][\text{X}^-]^2$
 C. $[\text{M}^{2+}]^2[\text{X}^-]$
 D. $[\text{MX}_2]$

✓ **Correct Answer: B** 💡 **Concept / Tip:** $K_{sp} = [\text{M}^{2+}][\text{X}^-]^2$ following stoichiometry.

MCQ 0956 / 1000

16. Alcohols & Phenols

956. The common ion effect generally causes the solubility of a sparingly soluble salt to? (Set 10)

- A. Increase
 B. Decrease
 C. Remain unchanged
 D. Become infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Adding a common ion shifts equilibrium toward the solid precipitate.

MCQ 0957 / 1000

17. Aldehydes & Ketones

957. For an exothermic forward reaction, increasing temperature shifts equilibrium toward? (Set 10)

- A. Products
 B. Reactants
 C. No shift
 D. Catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Heat acts as a product; raising T shifts equilibrium toward reactants.

MCQ 0958 / 1000

18. Carboxylic Acids & Derivatives

958. The value of the equilibrium constant K_c changes ONLY with a change in? (Set 10)

- A. Pressure
 B. Concentration
 C. Temperature
 D. Volume

✓ **Correct Answer: C** 💡 **Concept / Tip:** Temperature is the sole factor that changes the numerical value of K_c .

MCQ 0959 / 1000

19. Macromolecules (Proteins & Enzymes)

959. A buffer resists drastic changes in pH upon addition of small amounts of? (Set 10)

- A. Only acid
 B. Only base
 C. Both acid and base
 D. Neither acid nor base

✓ **Correct Answer: C** 💡 **Concept / Tip:** The weak acid component neutralizes added OH^- , while conjugate base neutralizes H^+ .

MCQ 0960 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

960. In Haber process $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ ($\Delta H < 0$), high yield of NH_3 is favored by? (Set 10)

- A. Low pressure and high T
 B. High pressure and low T
 C. Low pressure and low T
 D. High pressure and high T

✓ **Correct Answer: B** 💡 **Concept / Tip:** Exothermic and gas-volume-decreasing reaction.

MCQ 0961 / 1000

1. Stoichiometry & Moles

961. The unit of rate constant (k) for a first-order reaction is? (Set 10)

- A. $\text{mol dm}^{-3} \text{s}^{-1}$
 B. s^{-1}
 C. $\text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$
 D. $\text{dm}^6 \text{mol}^{-2} \text{s}^{-1}$

✓ **Correct Answer: B** 💡 **Concept / Tip:** Rate = $k[\text{A}] \rightarrow k = (\text{mol dm}^{-3} \text{s}^{-1}) / (\text{mol dm}^{-3}) = \text{s}^{-1}$.

MCQ 0962 / 1000

2. Atomic Structure & Quantum Theory

962. A catalyst increases reaction rate primarily by? (Set 10)

- A. Increasing collision frequency only
 B. Lowering activation energy barrier
 C. Shifting equilibrium position
 D. Increasing reactant temperature

✓ **Correct Answer: B** 💡 **Concept / Tip:** Provides an alternative reaction pathway with lower E_a .

MCQ 0963 / 1000

3. Gas Laws & Kinetic Molecular Theory

963. If doubling [A] quadruples the rate of reaction, the order with respect to A is? (Set 10)

- A. Zero order
B. First order
C. Second order
D. Third order

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} \propto [A]^2 \rightarrow 2^2 = 4$, so order is 2.

MCQ 0964 / 1000

4. Liquids & Hydrogen Bonding

964. Activation energy (E_a) is best defined as? (Set 10)

- A. Energy difference between reactants and products
B. Minimum energy required to form activated complex
C. Total heat released
D. Kinetic energy of catalyst

✓ **Correct Answer: B** 💡 **Concept / Tip:** Reactants must cross this energy barrier to convert to products.

MCQ 0965 / 1000

5. Solids & Lattice Energy

965. A zero-order reaction has a rate that is? (Set 10)

- A. Directly proportional to concentration
B. Independent of reactant concentration
C. Proportional to square of concentration
D. Zero

✓ **Correct Answer: B** 💡 **Concept / Tip:** $\text{Rate} = k [A]^0 = k$.

MCQ 0966 / 1000

6. Chemical Equilibrium & Le Chatelier

966. Increasing surface area of a solid reactant increases reaction rate because? (Set 10)

- A. It lowers activation energy
B. It increases exposed surface for effective collisions
C. It changes equilibrium constant
D. It stops reverse reaction

✓ **Correct Answer: B** 💡 **Concept / Tip:** More exposed particles increase collision frequency.

MCQ 0967 / 1000

7. Reaction Kinetics & Activation Energy

967. The half-life ($t_{1/2}$) of a first-order reaction is? (Set 10)

- A. Directly proportional to initial concentration
B. Inversely proportional to initial concentration
C. Independent of initial concentration
D. Zero

✓ **Correct Answer: C** 💡 **Concept / Tip:** $t_{1/2} = 0.693 / k$.

MCQ 0968 / 1000

8. Thermochemistry & Energetics

968. The slowest elementary step in a multi-step reaction mechanism is called the? (Set 10)

- A. Fast step
B. Rate-determining step
C. Equilibrium step
D. Initiation step

✓ **Correct Answer: B** 💡 **Concept / Tip:** Overall reaction rate cannot exceed the rate of its slowest step.

MCQ 0969 / 1000

9. Electrochemistry & Redox

969. Increasing temperature increases reaction rate mainly by? (Set 10)

- A. Decreasing reactant mass
B. Increasing fraction of molecules exceeding activation energy
C. Eliminating activation energy
D. Changing reaction order

✓ **Correct Answer: B** 💡 **Concept / Tip:** Maxwell-Boltzmann distribution shifts to higher kinetic energies.

MCQ 0970 / 1000

10. Chemical Bonding, VSEPR & Hybridization

970. The activated complex (transition state) is? (Set 10)

- A. A stable intermediate
B. A high-energy, unstable temporary arrangement
C. The final product
D. The unreacted starting material

✓ **Correct Answer: B** 💡 **Concept / Tip:** Located at the peak of the potential energy diagram.

MCQ 0971 / 1000

11. s- and p-Block Elements

971. An exothermic reaction is characterized by? (Set 10)

- A. Positive ΔH
B. Negative ΔH
C. Zero ΔH
D. Absorption of heat

✓ **Correct Answer: B** 💡 **Concept / Tip:** System releases heat to surroundings ($\Delta H < 0$).

MCQ 0972 / 1000

12. Transition Elements & Coordination

972. Hess's law of constant heat summation is a direct application of conservation of? (Set 10)

- A. Mass
B. Charge
C. Energy
D. Momentum

✓ **Correct Answer: C**  **Concept / Tip:** Enthalpy is a state function; ΔH total depends only on initial and final states.

MCQ 0973 / 1000

13. Fundamental Organic Chemistry & Isomerism

973. The standard enthalpy of formation (ΔH_f°) of an element in its standard state is? (Set 10)

- A. Always positive
B. Always negative
C. Defined as zero
D. 100 kJ/mol

✓ **Correct Answer: C**  **Concept / Tip:** Pure elements in standard states serve as reference zero.

MCQ 0974 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

974. A state function depends on? (Set 10)

- A. The specific path taken
B. Initial and final states only
C. Rate of reaction
D. Catalyst used

✓ **Correct Answer: B**  **Concept / Tip:** Path independent (e.g. U, H, T, P).

MCQ 0975 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

975. At constant pressure, the heat change accompanying a reaction equals? (Set 10)

- A. Internal energy change ΔU
B. Enthalpy change ΔH
C. Work done w
D. Equilibrium constant K

✓ **Correct Answer: B**  **Concept / Tip:** $q_p = \Delta H$ under constant pressure.

MCQ 0976 / 1000

16. Alcohols & Phenols

976. The first law of thermodynamics is expressed mathematically as? (Set 10)

- A. $\Delta U = q + w$
B. $\Delta H = q - w$
C. $PV = nRT$
D. $q = m c \Delta T$

✓ **Correct Answer: A**  **Concept / Tip:** Internal energy change = heat added + work done on system.

MCQ 0977 / 1000

17. Aldehydes & Ketones

977. Bond breaking is always an? (Set 10)

- A. Exothermic process
B. Endothermic process
C. Isothermal process
D. Energy-neutral process

✓ **Correct Answer: B**  **Concept / Tip:** Energy input is required to cleave chemical bonds.

MCQ 0978 / 1000

18. Carboxylic Acids & Derivatives

978. A reaction that absorbs heat from surroundings is described as? (Set 10)

- A. Exothermic
B. Endothermic
C. Spontaneous always
D. Adiabatic

✓ **Correct Answer: B**  **Concept / Tip:** System gains enthalpy ($\Delta H > 0$).

MCQ 0979 / 1000

19. Macromolecules (Proteins & Enzymes)

979. Heat capacity is defined as the amount of heat required to raise the temperature of a body by? (Set 10)

- A. 100°C
B. 1 K or 1°C
C. 0.1 K
D. 10 K

✓ **Correct Answer: B**  **Concept / Tip:** $C = q / \Delta T$.

MCQ 0980 / 1000

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

980. In a bomb calorimeter, heat change is measured at constant? (Set 10)

- A. Pressure
B. Volume
C. Temperature
D. Concentration

✓ **Correct Answer: B**  **Concept / Tip:** Rigid sealed vessel ensures constant volume ($q_v = \Delta U$).

MCQ 0981 / 1000

1. Stoichiometry & Moles

981. In an electrochemical cell, oxidation always occurs at the? (Set 10)

- A. Cathode
B. Anode
C. Salt bridge
D. Voltmeter

✓ **Correct Answer: B**  **Concept / Tip:** AnOx: Anode = Oxidation.

MCQ 0982 / 1000

2. Atomic Structure & Quantum Theory

982. In a galvanic (voltaic) cell, chemical energy is converted into? (Set 10)

- A. Heat energy only
B. Electrical energy
C. Nuclear energy
D. Mechanical energy

✓ **Correct Answer: B**  **Concept / Tip:** Spontaneous redox reaction drives electron flow.

MCQ 0983 / 1000

3. Gas Laws & Kinetic Molecular Theory

983. Reduction is defined as the? (Set 10)

- A. Loss of electrons
B. Gain of electrons
C. Gain of oxygen
D. Increase in oxidation state

✓ **Correct Answer: B**  **Concept / Tip:** RIG: Reduction Is Gain of electrons.

MCQ 0984 / 1000

4. Liquids & Hydrogen Bonding

984. The standard hydrogen electrode (SHE) is assigned a standard reduction potential of? (Set 10)

- A. 1.00 V
B. -1.00 V
C. 0.00 V
D. 0.76 V

✓ **Correct Answer: C**  **Concept / Tip:** SHE serves as the universal zero potential reference.

MCQ 0985 / 1000

5. Solids & Lattice Energy

985. A salt bridge in a galvanic cell serves to? (Set 10)

- A. Allow electron flow through it
B. Maintain electrical neutrality in half-cells
C. Stop ion movement
D. Increase cell voltage to infinity

✓ **Correct Answer: B**  **Concept / Tip:** Permits migration of inert ions to prevent charge buildup.

MCQ 0986 / 1000

6. Chemical Equilibrium & Le Chatelier

986. Standard cell EMF (E°_{cell}) is calculated as? (Set 10)

- A. $E^\circ_{\text{anode}} - E^\circ_{\text{cathode}}$
B. $E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$
C. $E^\circ_{\text{cathode}} \times E^\circ_{\text{anode}}$
D. $E^\circ_{\text{cathode}} + E^\circ_{\text{anode}}$

✓ **Correct Answer: B**  **Concept / Tip:** $E^\circ_{\text{cell}} = E^\circ_{\text{red}}(\text{cathode}) - E^\circ_{\text{red}}(\text{anode})$.

MCQ 0987 / 1000

7. Reaction Kinetics & Activation Energy

987. A species with a highly negative standard reduction potential acts as a? (Set 10)

- A. Strong oxidizing agent
B. Strong reducing agent
C. Weak reducing agent
D. Inert species

✓ **Correct Answer: B**  **Concept / Tip:** Readily loses electrons (easily oxidized).

MCQ 0988 / 1000

8. Thermochemistry & Energetics

988. In the electrolysis of molten NaCl, sodium metal is deposited at the? (Set 10)

- A. Anode
B. Cathode
C. Salt bridge
D. Electrolyte surface

✓ **Correct Answer: B**  **Concept / Tip:** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na(s)}$ reduction at cathode.

MCQ 0989 / 1000

9. Electrochemistry & Redox

989. The oxidation number of sulfur in H_2SO_4 is? (Set 10)

- A. +2
B. +4
C. +6
D. -2

✓ **Correct Answer: C**  **Concept / Tip:** $2(+1) + \text{S} + 4(-2) = 0 \rightarrow \text{S} = +6$.

MCQ 0990 / 1000

10. Chemical Bonding, VSEPR & Hybridization

990. Corrosion of iron (rusting) is fundamentally an? (Set 10)

- A. Acid-base reaction
 B. Electrochemical (redox) process
 C. Elimination reaction
 D. Isothermal physical change

✓ **Correct Answer: B** 💡 **Concept / Tip:** Iron acts as anode and oxygen reduction occurs at cathodic sites.

MCQ 0991 / 1000

11. s- and p-Block Elements

991. According to VSEPR theory, CH₄ has what molecular geometry? (Set 10)

- A. Linear
 B. Trigonal planar
 C. Tetrahedral
 D. Bent

✓ **Correct Answer: C** 💡 **Concept / Tip:** 4 bonding pairs, 0 lone pairs = 109.5° tetrahedral.

MCQ 0992 / 1000

12. Transition Elements & Coordination

992. The molecular shape of NH₃ is trigonal pyramidal rather than tetrahedral because of? (Set 10)

- A. 3 lone pairs
 B. Repulsion from 1 lone pair on nitrogen
 C. 2 lone pairs
 D. Nonpolar C-H bonds

✓ **Correct Answer: B** 💡 **Concept / Tip:** 1 lone pair distorts bond angle to ~107°.

MCQ 0993 / 1000

13. Fundamental Organic Chemistry & Isomerism

993. Carbon atom in ethene (CH₂=CH₂) undergoes which type of hybridization? (Set 10)

- A. sp³
 B. sp²
 C. sp
 D. dsp²

✓ **Correct Answer: B** 💡 **Concept / Tip:** 3 sigma domains = sp² hybridization with 120° planar geometry.

MCQ 0994 / 1000

14. Hydrocarbons (Alkanes, Alkenes, Alkynes, Benzene)

994. A double covalent bond consists of? (Set 10)

- A. Two sigma bonds
 B. Two pi bonds
 C. One sigma and one pi bond
 D. One sigma bond only

✓ **Correct Answer: C** 💡 **Concept / Tip:** First bond is σ (head-on); second is π (sideways p-overlap).

MCQ 0995 / 1000

15. Alkyl Halides (SN1, SN2, E1, E2)

995. BF₃ molecule is nonpolar despite polar B-F bonds because its geometry is? (Set 10)

- A. Tetrahedral
 B. Trigonal planar
 C. Bent
 D. Trigonal pyramidal

✓ **Correct Answer: B** 💡 **Concept / Tip:** Symmetric 120° arrangement cancels individual dipole vectors.

MCQ 0996 / 1000

16. Alcohols & Phenols

996. A pi (π) bond is formed by? (Set 10)

- A. Head-on s-s overlap
 B. Sideways overlap of parallel p orbitals
 C. Head-on p-p overlap
 D. Ionic attraction

✓ **Correct Answer: B** 💡 **Concept / Tip:** Electron density lies above and below internuclear axis.

MCQ 0997 / 1000

17. Aldehydes & Ketones

997. SF₆ central sulfur atom exhibits which hybridization and shape? (Set 10)

- A. sp³, Tetrahedral
 B. sp³d², Octahedral
 C. sp³d, Trigonal bipyramidal
 D. sp², Planar

✓ **Correct Answer: B** 💡 **Concept / Tip:** 6 bonding domains = sp³d² octahedral.

MCQ 0998 / 1000

18. Carboxylic Acids & Derivatives

998. Bond energy generally increases as bond length? (Set 10)

- A. Increases
 B. Decreases
 C. Remains constant
 D. Becomes infinite

✓ **Correct Answer: B** 💡 **Concept / Tip:** Shorter bonds have stronger electrostatic hold and higher energy.

19. Macromolecules (Proteins & Enzymes)

999. Hybridization of central carbon in ethyne ($\text{HC}\equiv\text{CH}$) is? (Set 10)

- A. sp³
B. sp²
C. sp
D. dsp²

✓ **Correct Answer: C** **Concept / Tip:** 2 sigma domains = sp linear geometry (180°).

20. Industrial Chemistry (Polymers, Dyes, Adhesives)

1000. The molecule H_2O has a bent shape with a bond angle of $\sim 104.5^\circ$ due to? (Set 10)

- A. No lone pairs
B. 1 lone pair
C. 2 lone pairs on oxygen
D. 3 lone pairs

✓ **Correct Answer: C** 💡 **Concept / Tip:** 2 lone pairs compress the ideal 109.5° tetrahedral angle.