CHEMISTRY

CLASS XI

COMPETENCY BASED EXAM – JULY 2025

Q1. Which of the following statements about isotopes is correct?
A. They have the same mass number but different atomic numbers
B. They have the same atomic number but different mass numbers
C. They have different atomic numbers and different mass numbers
D. They have identical physical and chemical properties

Answer: B. They have the same atomic number but different mass numbers

Q2. The energy of an electron in the hydrogen atom depends on:
A. Principal quantum number (n) only
B. Azimuthal quantum number (l) only
C. Both n and l
D. Spin quantum number (s)

Answer: A. Principal quantum number (n) only

Q3. Which of the following orbitals has spherical symmetry?
A. p-orbital
B. d-orbital
C. f-orbital
D. s-orbital

Answer: D. s-orbital

Q4. The maximum number of electrons that can be accommodated in the n = 3 shell is:
A. 8
B. 18
C. 32
D. 10

Answer: B. 18

Q5. According to Bohr's model, the angular momentum of an electron in the nth orbit is given by:
A. $\dfrac{nh}{2\pi}$
B. $\dfrac{h}{2\pi n}$
C. $\dfrac{n^2 h}{2\pi}$
D. $\dfrac{h}{n}$

Answer: A. $\dfrac{nh}{2\pi}$

Q6. The uncertainty principle is mathematically expressed as:
A. $\Delta x \cdot \Delta p \geq \dfrac{h}{2\pi}$
B. $\Delta x \cdot \Delta p \leq \dfrac{h}{2\pi}$
C. $\Delta E \cdot \Delta t \leq \dfrac{h}{2\pi}$
D. Both A and C

Answer: D. Both A and C

Q7. The number of nodal planes in a d_{xy} orbital is:
A. 0
B. 1
C. 2
D. 3

Answer: C. 2

Q8. Which of the following pairs of quantum numbers is NOT possible?
A. (n = 3, l = 2, m = 0)
B. (n = 2, l = 1, m = -1)
C. (n = 1, l = 0, m = 0)
D. (n = 3, l = 3, m = 0)

Answer: D. (n = 3, l = 3, m = 0) (since (l < n))

Q9. The effective nuclear charge experienced by an electron is best explained by:
A. Hund's rule
B. Pauli exclusion principle
C. Slater's rules
D. Aufbau principle

Answer: C. Slater's rules

Q10. The wavelength of the first line in the Lyman series of hydrogen corresponds to transition:
A. (n = 2 \to n = 1)
B. (n = 3 \to n = 1)
C. (n = 4 \to n = 1)
D. (n = \infty \to n = 1)

Answer: A. (n = 2 \to n = 1)