CLASS 11 CHEMISTRY EXTRA QUESTIONS

Class 11 Chemistry Chapter 2 Structure of Atom – Extra Questions with Answers

Extra practice questions for Class 11 Chemistry Chapter 2 (Structure of Atom), beyond the textbook. These Class 11 Chemistry Chapter 2 important questions are handy for last-minute exam practice.

Contents

Extra practice questions for Class 11 Chemistry Chapter 2 (Structure of Atom), beyond the textbook. These Class 11 Chemistry Chapter 2 important questions are handy for last-minute exam practice.

Very Short Answer Questions (1 mark)

Q1. Who discovered the electron?
Ans: J.J. Thomson.

Q2. Who discovered the neutron?
Ans: James Chadwick.

Q3. What does the azimuthal quantum number represent?
Ans: The shape of the subshell/orbital (s, p, d, f).

Q4. State Hund's rule.
Ans: Orbitals of equal energy are each singly occupied before any is doubly occupied.

Q5. What is the maximum number of electrons in the n=2 shell?
Ans: 8 ($2n^2=2(2)^2=8$).

Short Answer Questions (2–3 marks)

Q6. Write the electronic configuration of sodium (Z=11).
Ans: $1s^2\ 2s^2\ 2p^6\ 3s&sup9;9^1$ (i.e. $1s^22s^22p^63s^1$).

Q7. Calculate the number of protons, electrons, and neutrons in an atom with atomic number 17 and mass number 35.
Ans: Protons=17, Electrons=17 (neutral atom), Neutrons=35−17=18.

Q8. What are isotopes? Give an example.
Ans: Atoms of the same element with the same number of protons but different numbers of neutrons (different mass numbers), e.g. Carbon-12 and Carbon-14.

Higher-Order Thinking / Application Questions

Q9. Explain why Bohr's model, despite successfully explaining the hydrogen spectrum, failed to explain the spectra of multi-electron atoms, and how the quantum mechanical model addresses this limitation.
Ans: Bohr's model treated electrons as moving in fixed, well-defined circular orbits around the nucleus, which works reasonably well for hydrogen (a one-electron system) because there are no electron-electron repulsions to complicate the energy levels. However, in multi-electron atoms, electron-electron repulsions significantly affect the energy of each electron in ways Bohr's simple model could not account for, since it did not consider interactions between electrons or the wave nature of matter. The quantum mechanical model resolves this by treating electrons using wave functions (orbitals) derived from the Schrödinger equation, which inherently account for electron probability distributions and can be extended (with approximations) to handle multi-electron interactions, giving a far more accurate description of atomic structure and spectra for complex atoms.

Q10. Using the Aufbau principle, Pauli exclusion principle, and Hund's rule together, explain why the electronic configuration of chromium (Z=24) is $[Ar]3d^54s^1$ rather than the "expected" $[Ar]3d^44s^2$.

Ans: According to the Aufbau principle alone, one might expect chromium's configuration to fill 4s before 3d, giving [Ar]$3d^4 4s^2$. However, atoms tend to achieve extra stability when d-subshells are exactly half-filled ($3d^5$) or fully filled ($3d^{10}$), because half-filled and fully-filled subshells have more symmetrical electron distribution and greater exchange energy (a stabilization effect related to Hund's rule, where electrons with parallel spins in degenerate orbitals lower the overall energy more than expected). In chromium's case, moving one electron from 4s to 3d to achieve a half-filled $3d^5 4s^1$ configuration (5 unpaired d electrons + 1 s electron, all with parallel spin where possible) results in a lower overall energy state than the "regular" $3d^4 4s^2$ configuration, so the atom adopts this more stable arrangement in practice, illustrating that exceptions to the simple Aufbau filling order arise from extra stability associated with half-filled and fully-filled subshells.

Class 11 Chemistry Chapter 2 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 11 Chemistry Chapter 2 Solutions and Class 11 Chemistry Chapter 2 Revision Notes.

See also: Chapter 1 | Chapter 2

Practice more: Chapter 1

Quick revision: Chapter 1