

QUICK DRILL · CBSE CLASS 11

Structure of Atom

Chemistry · Chapter 2 · 15 MCQs · 20 minutes · PYQ-tagged with time budgets

DATE	TOTAL MARKS 15	DURATION 20 min	MARKING +1 / 0	TARGET ≥ 12/15
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OBJECTIVES

Reinforce the four core topics of Structure of Atom via 15 PYQ-derived MCQs. Identify weak sub-topics via concept-node IDs (see answer key). Build per-question time budget habit.

INSTRUCTIONS

Attempt all 15. Time budget shown per Q (use it as pacing guide). Mark answers (A/B/C/D) in the margin. Answer key + explanations on the last page. **Don't peek — score yourself honestly.**

SECTION · QUICK DRILL

Q 1-15 · 20 MIN

Q1. The atomic number Z of an element is equal to:

- (A) Number of neutrons
(C) Number of nucleons

- (B) Number of protons
(D) Mass number

PYQ 2018 · Delhi · 1m · 30s

Q2. Which scientist discovered the neutron?

- (A) J.J. Thomson
(C) James Chadwick

- (B) E. Rutherford
(D) Niels Bohr

PYQ 2019 · AI · 1m · 30s

Q3. Energy of an electron in the $n=1$ orbit of H-atom is:

- (A) -3.4 eV
(C) -1.51 eV

- (B) -13.6 eV
(D) -0.85 eV

PYQ 2020 · Delhi · 1m · 30s

Q4. The Balmer series of hydrogen spectrum lies in:

- (A) Ultraviolet region
(C) Infrared region

- (B) Visible region
(D) Far infrared region

PYQ 2018 · AI · 1m · 30s

Q5. According to Bohr, the angular momentum of an electron in n th orbit is:

- (A) nh/π
(C) $h/(2\pi n)$

- (B) $nh/(2\pi)$
(D) $2\pi nh$

PYQ 2019 · Delhi · 1m · 30s

Q6. The de Broglie wavelength of a particle is given by:

- (A) $\lambda = h \cdot v$
(C) $\lambda = mv/h$

- (B) $\lambda = h/(mv)$
(D) $\lambda = m/v$

PYQ 2021 · Delhi · 1m · 30s

Q7. Heisenberg's uncertainty principle is given by:

- (A) $\Delta x \cdot \Delta p = h$
(C) $\Delta x \cdot \Delta p \leq h/(2\pi)$

- (B) $\Delta x \cdot \Delta p \geq h/(4\pi)$
(D) $\Delta x \cdot \Delta p = h/(2\pi)$

PYQ 2020 · Delhi · 1m · 30s

Q8. Maximum number of electrons in a subshell with $l=2$ is:

- (A) 6
(C) 14

- (B) 10
(D) 2

PYQ 2022 · AI · 1m · 30s

Q9. The electronic configuration of Cr ($Z=24$) is:

- (A) $[\text{Ar}] 3d^4 4s^2$
(C) $[\text{Ar}] 3d^6 4s^0$

- (B) $[\text{Ar}] 3d^5 4s^1$
(D) $[\text{Ar}] 4s^2 3d^4$

PYQ 2022 · Delhi · 1m · 30s

Q10. The number of orbitals in a subshell with $l = 3$ is:

- (A) 5
(C) 9

- (B) 7
(D) 3

PYQ 2023 · AI · 1m · 30s

Q11. The shape of a p-orbital is:

- (A) Spherical
(C) Double dumb-bell

PYQ 2019 · Delhi · 1 m · 30s

- (B) Dumb-bell
(D) Cloverleaf

Q12. Photoelectric effect was explained by:

- (A) Planck
(C) Bohr

PYQ 2020 · AI · 1 m · 30s

- (B) Einstein
(D) de Broglie

Q13. Which of the following has the same number of neutrons as ^{40}Ca ($Z=20$)?

- (A) ^{40}K ($Z=19$)
(C) ^{39}K ($Z=19$)

PYQ 2018 · Delhi · 1 m · 30s

- (B) ^{40}Ar ($Z=18$)
(D) ^{41}Ca ($Z=20$)

Q14. The Aufbau principle is violated by:

- (A) Sodium
(C) Calcium

PYQ 2024 · Delhi · 1 m · 30s

- (B) Chromium
(D) Argon

Q15. The principal quantum number tells us about:

- (A) Shape of orbital
(C) Size and energy of orbital

PYQ 2021 · AI · 1 m · 30s

- (B) Orientation of orbital
(D) Spin of electron

ANSWER KEY & EXPLANATIONS

Q 1-15 · MARK YOUR SCORE

Q1. Answer: B

Z = number of protons in nucleus = number of electrons in neutral atom. Defines the element.

Q2. Answer: C

Chadwick (1932) bombarded Be with alpha particles and detected neutral radiation that knocked protons out of paraffin.

Q3. Answer: B

$E_n = -13.6/n^2$ eV. For $n=1$: $E_1 = -13.6$ eV. This is the ionisation energy of H.

Q4. Answer: B

Balmer series ends at $n=2$; first line at 656.3 nm (visible red, H-alpha). Lyman (UV), Paschen (IR).

Q5. Answer: B

Bohr's second postulate: $mvr = nh/(2\pi)$, $n=1,2,3,\dots$ (quantisation of angular momentum).

Q6. Answer: B

de Broglie: $\lambda = h/p = h/(mv)$. Heavier or faster $\rightarrow$ smaller wavelength.

Q7. Answer: B

$\Delta x \cdot \Delta p \geq h/(4\pi)$. Position and momentum cannot both be known exactly. Fundamental — not measurement error.

Q8. Answer: B

Max e⁻ in subshell = $2(2l+1)$. For $l=2$ (d-subshell): $2(5) = 10$. d-subshell has 5 orbitals $\times 2 = 10$ electrons.

Q9. Answer: B

Half-filled $3d^5$ is extra stable (max exchange energy + symmetric distribution). One 4s electron 'promotes' to 3d.

Q10. Answer: B

Number of orbitals in subshell = $2l+1$. For $l=3$ (f-subshell): $2(3)+1 = 7$ orbitals; max 14 electrons.

Q11. Answer: B

s = sphere; p = dumb-bell (along x, y, z); d = double dumb-bell / cloverleaf; f = complex.

Q12. Answer: B

Einstein (1905) extended Planck's quantum hypothesis: $h\nu = W_0 + KE_{\text{max}}$. Got Nobel Prize 1921 for this.

Q13. Answer: C

Same N = isotones. Ca-40: $N=20$. K-39 ($Z=19$): $N = 39-19 = 20$. $\checkmark$ Same $N \rightarrow$ isotones.

Q14. Answer: B

Cr = $[\text{Ar}] 3d^5 4s^1$ (not $3d^4 4s^2$ per pure Aufbau). Cu similarly. Half/full-filled stability.

Q15. Answer: C

$n \rightarrow$ size + main energy of shell. $l \rightarrow$ shape (s/p/d/f). $m_l \rightarrow$ orientation. $m_s \rightarrow$ spin.