

CHEMISTRY · JEE MAIN

Atomic Structure

Chapter-wise previous year questions, with answer key

127

PYQS

2020–2025

PAPERS

8

TOPICS

Bohr's Model

Quantum Numbers

Orbitals and Electronic Configuration

Atomic Spectra

Aufbau, Pauli and Hund

Shapes of Orbitals

Discovery of Subatomic Particles

Electronic Configuration

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

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Bohr's Model · 28 PYQs

Q1 JEE Main 2025 · 8 Apr · Shift 2

The energy of an electron in the first Bohr orbit of the H-atom is -13.6 eV.

The magnitude of energy value of an electron in the first excited state of Be^{3+} is _____ eV (nearest integer value).

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/U_BaqfDXcj](https://www.prepwiser.in/questions/U_BaqfDXcj)

Q2 JEE Main 2025 · 3 Apr · Shift 1

Which of the following postulate of Bohr's model of hydrogen atom is not in agreement with quantum mechanical model of an atom?

- (A) The electron in a H atom's stationary state moves in a circle around the nucleus.
- (B) An atom can take only certain distinct energies E_1, E_2, E_3 , etc. These allowed states of constant energy are called the stationary states of atom.
- (C) An atom in a stationary state does not emit electromagnetic radiation as long as it stays in the same state.
- (D) When an electron makes a transition from a higher energy stationary state to a lower energy stationary state, then it emits a photon of light.

[Step-by-step solution ► prepwiser.in/questions/MK9-3-Bnrb](https://www.prepwiser.in/questions/MK9-3-Bnrb)

Q3 JEE Main 2025 · 2 Apr · Shift 1

According to Bohr's model of hydrogen atom, which of the following statement is incorrect?

- (A) Radius of 4th orbit is four times larger than that of 2nd orbit
- (B) Radius of 8th orbit is four times larger than that of 4th orbit
- (C) Radius of 6th orbit is three times larger than that of 4th orbit
- (D) Radius of 3rd orbit is nine times larger than that of 1st orbit

[Step-by-step solution ► prepwiser.in/questions/_q75eRGqx9](https://www.prepwiser.in/questions/_q75eRGqx9)

Q4 JEE Main 2025 · 29 Jan · Shift 1

If a_0 is denoted as the Bohr radius of hydrogen atom, then what is the de-Broglie wavelength (λ) of the electron present in the second orbit of hydrogen atom? [n : any integer]

- (A) $\frac{8\pi a_0}{n}$
- (B) $\frac{2a_0}{n\pi}$
- (C) $\frac{na_0}{4\pi}$
- (D) $\frac{4\pi a_0}{n}$

[Step-by-step solution ► prepwiser.in/questions/nIJB4AfZ5C](https://www.prepwiser.in/questions/nIJB4AfZ5C)

Q5 JEE Main 2025 · 28 Jan · Shift 2

Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom?

(A) $1s < 2p < 3d < 4s$

(B) $1s < 2s = 2p < 3s = 3p$

(C) $1s < 2s < 2p < 3s < 3p$

(D) $1s < 2s < 4s < 3d$

Choose the **correct** answer from the options given below :

(A) (A) and (B) only

(B) (A) and (C) only

(C) (B) and (D) only

(D) (C) and (D) only

[Step-by-step solution ► prepwiser.in/questions/TL_vNgGGd6](https://www.prepwiser.in/questions/TL_vNgGGd6)

Q6 JEE Main 2025 · 22 Jan · Shift 1

Radius of the first excited state of Helium ion is given as : $a_0 \rightarrow$ radius of first stationary state of hydrogen atom.

(A) $r = \frac{a_0}{4}$

(B) $r = 2a_0$

(C) $r = 4a_0$

(D) $r = \frac{a_0}{2}$

[Step-by-step solution ► prepwiser.in/questions/hCcTU6OTks](https://www.prepwiser.in/questions/hCcTU6OTks)

Q7 JEE Main 2024 · 6 Apr · Shift 2

For hydrogen atom, energy of an electron in first excited state is -3.4eV , K.E. of the same electron of hydrogen atom is $x\text{eV}$. Value of x is $\text{_____} \times 10^{-1}\text{eV}$. (Nearest integer)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/YIf5t8ty1G](https://www.prepwiser.in/questions/YIf5t8ty1G)

Q8 JEE Main 2024 · 6 Apr · Shift 1

Frequency of the de-Broglie wave of electron in Bohr's first orbit of hydrogen atom is $\text{_____} \times 10^{13}\text{Hz}$ (nearest integer).

[Given : R_H (Rydberg constant) = $2.18 \times 10^{-18}\text{J}$, h (Plank's constant) = $6.6 \times 10^{-34}\text{J.s}$.]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/sNc_fZh8PP](https://www.prepwiser.in/questions/sNc_fZh8PP)

Q9 JEE Main 2024 · 5 Apr · Shift 1

The value of Rydberg constant (R_H) is $2.18 \times 10^{-18}\text{J}$. The velocity of electron having mass $9.1 \times 10^{-31}\text{kg}$ in Bohr's first orbit of hydrogen atom = $\text{_____} \times 10^5\text{ms}^{-1}$ (nearest integer).

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/81Uf5ALgVh](https://www.prepwiser.in/questions/81Uf5ALgVh)

Q10 JEE Main 2024 · 4 Apr · Shift 1

The de-Broglie's wavelength of an electron in the 4^{th} orbit is $\text{_____} \pi a_0$. (a_0 = Bohr's radius)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/XCfrs2W_SG](https://www.prepwiser.in/questions/XCfrs2W_SG)

Q11 JEE Main 2023 · 15 Apr · Shift 1

Given below are two statements:

Statement I : According to Bohr's model of hydrogen atom, the angular momentum of an electron in a given stationary state is quantised.

Statement II : The concept of electron in Bohr's orbit, violates the Heisenberg uncertainty principle.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (A) Both Statement I and Statement II are incorrect
- (B) Statement I is correct but Statement II is incorrect
- (C) Both Statement I and Statement II are correct
- (D) Statement I is incorrect but Statement II is correct

[Step-by-step solution ► prepwiser.in/questions/cY_4pZejAy](https://www.prepwiser.in/questions/cY_4pZejAy)

Q12 JEE Main 2023 · 13 Apr · Shift 1

The energy of an electron in the first Bohr orbit of hydrogen atom is $-2.18 \times 10^{-18} \text{ J}$. Its energy in the third Bohr orbit is _____.

- (A) One third of this value
- (B) Three times of this value
- (C) $\frac{1}{9}$ th of this value
- (D) $\frac{1}{27}$ of this value

[Step-by-step solution ► prepwiser.in/questions/p5Sm_WLzfw](https://www.prepwiser.in/questions/p5Sm_WLzfw)

Q13 JEE Main 2023 · 6 Apr · Shift 2

If the radius of the first orbit of hydrogen atom is α_0 , then de Broglie's wavelength of electron in 3rd orbit is :

- (A) $\frac{\pi \alpha_0^3}{6}$
- (B) $3\pi \alpha_0$
- (C) $6\pi \alpha_0$
- (D) $\frac{\pi \alpha_0^3}{3}$

[Step-by-step solution ► prepwiser.in/questions/o3R0jIVVsB](https://www.prepwiser.in/questions/o3R0jIVVsB)

Q14 JEE Main 2023 · 29 Jan · Shift 2

Assume that the radius of the first Bohr orbit of hydrogen atom is $0.6 \text{ \AA}$. The radius of the third Bohr orbit of He^+ is _____ picometer. (Nearest Integer)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/97fNqvpEOU](https://www.prepwiser.in/questions/97fNqvpEOU)

Q15 JEE Main 2023 · 25 Jan · Shift 1

The radius of the 2nd orbit of Li^{2+} is x . The expected radius of the 3rd orbit of Be^{3+} is

- (A) $\frac{16}{27}x$
- (B) $\frac{4}{9}x$
- (C) $\frac{9}{4}x$
- (D) $\frac{27}{16}x$

[Step-by-step solution ► prepwiser.in/questions/4AU-JNFt0B](https://www.prepwiser.in/questions/4AU-JNFt0B)

Q16 JEE Main 2022 · 26 Jul · Shift 1

The wavelength of an electron and a neutron will become equal when the velocity of the electron is x times the velocity of neutron. The value of x is _____. (Nearest Integer)

(Mass of electron is 9.1×10^{-31} kg and mass of neutron is 1.6×10^{-27} kg)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/6mYibEoxu0](https://www.prepwiser.in/questions/6mYibEoxu0)

Q17 JEE Main 2022 · 26 Jun · Shift 1

If the radius of the 3rd Bohr's orbit of hydrogen atom is r_3 and the radius of 4th Bohr's orbit is r_4 . Then :

(A) $r_4 = \frac{9}{16} r_3$

(B) $r_4 = \frac{16}{9} r_3$

(C) $r_4 = \frac{3}{4} r_3$

(D) $r_4 = \frac{4}{3} r_3$

[Step-by-step solution ► prepwiser.in/questions/eu4ozKfqLC](https://www.prepwiser.in/questions/eu4ozKfqLC)

Q18 JEE Main 2022 · 25 Jun · Shift 1

The longest wavelength of light that can be used for the ionisation of lithium atom (Li) in its ground state is $x \times 10^{-8}$ m. The value of x is _____. (Nearest Integer).

(Given : Energy of the electron in the first shell of the hydrogen atom is -2.2×10^{-18} J ; $h = 6.63 \times 10^{-34}$ Js and $c = 3 \times 10^8$ ms⁻¹)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/HkSvoYAL9s](https://www.prepwiser.in/questions/HkSvoYAL9s)

Q19 JEE Main 2021 · 27 Aug · Shift 1

The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is equal to $\frac{h^2}{xma_0^2}$. The value of $10x$ is _____. (a_0 is radius of Bohr's orbit) (Nearest integer) [Given : $\pi = 3.14$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/jn0iMWSFN1](https://www.prepwiser.in/questions/jn0iMWSFN1)

Q20 JEE Main 2021 · 26 Aug · Shift 1

Given below are two statements.

Statement I : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in positive charges on the nucleus as there is no strong hold on the electron by the nucleus.

Statement II : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in principal quantum number.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Both Statement I and Statement II are false

(B) Both Statement I and Statement II are true

(C) Statement I is false but Statement II is true

(D) Statement I is true but Statement II is false

[Step-by-step solution ► prepwiser.in/questions/jzhTMFLMTx](https://www.prepwiser.in/questions/jzhTMFLMTx)

Q21 JEE Main 2021 · 27 Jul · Shift 1

Given below are two statements :

Statement I : Rutherford's gold foil experiment cannot explain the line spectrum of hydrogen atom.

Statement II : Bohr's model of hydrogen atom contradicts Heisenberg's uncertainty principle.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is false but statement II is true.

(B) Statement I is true but statement II is false.

(C) Both statement I and statement II are false.

(D) Both statement I and statement II are true.

[Step-by-step solution ► prepwisar.in/questions/G6o5Bq3_xI](https://www.prepwisar.in/questions/G6o5Bq3_xI)

Q22 JEE Main 2021 · 20 Jul · Shift 2

The wavelength of electrons accelerated from rest through a potential difference of 40 kV is $x \times 10^{-12}$ m. The value of x is _____. (Nearest integer)

Give : Mass of electron = 9.1×10^{-31} kg

Charge on an electron = 1.6×10^{-19} C

Planck's constant = 6.63×10^{-34} Js

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/cbEjTmMUcQ](https://www.prepwisar.in/questions/cbEjTmMUcQ)

Q23 JEE Main 2021 · 18 Mar · Shift 2

Given below are two statements :

Statement I : Bohr's theory accounts for the stability and line spectrum of Li^+ ion.

Statement II : Bohr's theory was unable to explain the splitting of spectral lines in the presence of a magnetic field.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is false but statement II is true.

(B) Both statement I and statement II are true.

(C) Statement I is true but statement II is false.

(D) Both statement I and statement II are false.

[Step-by-step solution ► prepwisar.in/questions/2r7TU-XUT6](https://www.prepwisar.in/questions/2r7TU-XUT6)

Q24 JEE Main 2021 · 24 Feb · Shift 1

A proton and a Li^{3+} nucleus are accelerated by the same potential. If λ_{Li} and λ_p denote the de Broglie wavelengths of Li^{3+} and proton respectively, then the value of $\frac{\lambda_{\text{Li}}}{\lambda_p}$ is $x \times 10^{-1}$.

The value of x is _____. (Rounded off to the nearest integer)

[Mass of $\text{Li}^{3+} = 8.3$ mass of proton]

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/XqEiGp2brQ](https://www.prepwisser.in/questions/XqEiGp2brQ)

Q25 JEE Main 2021 · 24 Feb · Shift 2

According to Bohr's atomic theory :

(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$.

(B) The product of velocity (v) of electron and principal quantum number (n), ' vn ' $\propto Z^2$.

(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.

(D) Coulombic force of attraction on the electron is $\propto \frac{Z^3}{n^4}$.

Choose the most appropriate answer from the options given below :

(A) (A), (C) and (D) only

(B) (A) only

(C) (C) only

(D) (A) and (D) only

[Step-by-step solution ► prepwisser.in/questions/EpTbYqjg5M](https://www.prepwisser.in/questions/EpTbYqjg5M)

Q26 JEE Main 2020 · 5 Sep · Shift 1

The difference between the radii of 3rd and 4th orbits of Li^{2+} is R_1 . The difference between the radii of 3rd and 4th orbits of He^+ is ΔR_2 .

Ratio $\Delta R_1 : \Delta R_2$ is :

(A) 8 : 3

(B) 3 : 2

(C) 2 : 3

(D) 3 : 8

[Step-by-step solution ► prepwisser.in/questions/SrMwxXEmeo](https://www.prepwisser.in/questions/SrMwxXEmeo)

Q27 JEE Main 2020 · 9 Jan · Shift 1

The de Broglie wavelength of an electron in the 4th Bohr orbit is :

(A) $2\pi a_0$

(B) $6\pi a_0$

(C) $8\pi a_0$

(D) $4\pi a_0$

[Step-by-step solution ► prepwisser.in/questions/wWqazssfH2](https://www.prepwisser.in/questions/wWqazssfH2)

Q28 JEE Main 2020 · 8 Jan · Shift 2

The radius of the second Bohr orbit, in terms of the Bohr radius, a_0 , in Li^{2+} is :

- (A) $\frac{2a_0}{9}$ (B) $\frac{2a_0}{3}$
(C) $\frac{4a_0}{9}$ (D) $\frac{4a_0}{3}$

[Step-by-step solution](#) ► [prepwiser.in/questions/cINTT-FXtP](https://www.prepwiser.in/questions/cINTT-FXtP)

Quantum Numbers · 32 PYQs

Q29 JEE Main 2025 · 4 Apr · Shift 2

Consider the ground state of chromium atom ($Z = 24$). How many electrons are with Azimuthal quantum number $l = 1$ and $l = 2$ respectively ?

- (A) 16 and 5 (B) 12 and 5
(C) 12 and 4 (D) 16 and 4

[Step-by-step solution](#) ► [prepwiser.in/questions/QagFsoKZaO](https://www.prepwiser.in/questions/QagFsoKZaO)

Q30 JEE Main 2025 · 3 Apr · Shift 2

For electrons in '2s' and '2p' orbitals, the orbital angular momentum values, respectively are:

- (A) 0 and $\sqrt{6} \frac{h}{2\pi}$
(B) 0 and $\sqrt{2} \frac{h}{2\pi}$
(C) $\sqrt{2} \frac{h}{2\pi}$ and 0
(D) $\frac{h}{2\pi}$ and $\sqrt{2} \frac{h}{2\pi}$

[Step-by-step solution](#) ► [prepwiser.in/questions/YXkBRQiIIu](https://www.prepwiser.in/questions/YXkBRQiIIu)

Q31 JEE Main 2025 · 29 Jan · Shift 2

Given below are two statements :

Statement (I): It is impossible to specify simultaneously with arbitrary precision, both the linear momentum and the position of a particle.

Statement (II): If the uncertainty in the measurement of position and uncertainty in measurement of momentum are equal for an electron, then the uncertainty in the measurement of velocity is $\geq \sqrt{\frac{h}{\pi}} \times \frac{1}{2m}$.

In the light of the above statements, choose the correct answer from the options given below :

- (A) **Statement I** is false but **Statement II** is true
(B) Both **Statement I** and **Statement II** are true
(C) Both **Statement I** and **Statement II** are false
(D) **Statement I** is true but **Statement II** is false

[Step-by-step solution](#) ► [prepwiser.in/questions/d7TE-Gf9Ew](https://www.prepwiser.in/questions/d7TE-Gf9Ew)

Q32 JEE Main 2025 · 28 Jan · Shift 1

In a multielectron atom, which of the following orbitals described by three quantum numbers will have same energy in absence of electric and magnetic fields?

- A. $n = 1, l = 0, m_l = 0$
- B. $n = 2, l = 0, m_l = 0$
- C. $n = 2, l = 1, m_l = 1$
- D. $n = 3, l = 2, m_l = 1$
- E. $n = 3, l = 2, m_l = 0$

Choose the correct answer from the options given below:

- (A) B and C Only
- (B) C and D Only
- (C) A and B Only
- (D) D and E Only

[Step-by-step solution ► prepwiser.in/questions/IqlwUK1CCJ](https://www.prepwiser.in/questions/IqlwUK1CCJ)

Q33 JEE Main 2025 · 23 Jan · Shift 2

Given below are two statements :

Statement (I) : For a given shell, the total number of allowed orbitals is given by n^2 .

Statement (II) : For any subshell, the spatial orientation of the orbitals is given by $-l$ to $+l$ values including zero.

In the light of the above statements, choose the correct answer from the options given below :

- (A) Both Statement I and Statement II are true
- (B) Both Statement I and Statement II are false
- (C) Statement I is false but Statement II is true
- (D) Statement I is true but Statement II is false

[Step-by-step solution ► prepwiser.in/questions/UWXiCUAgI3](https://www.prepwiser.in/questions/UWXiCUAgI3)

Q34 JEE Main 2024 · 9 Apr · Shift 1

Compare the energies of following sets of quantum numbers for multielectron system.

- (A) $n = 4, l = 1$
- (B) $n = 4, l = 2$
- (C) $n = 3, l = 1$
- (D) $n = 3, l = 2$
- (E) $n = 4, l = 0$

Choose the correct answer from the options given below :

- (A) (E) > (C) > (A) > (D) > (B)
- (B) (B) > (A) > (C) > (E) > (D)
- (C) (C) < (E) < (D) < (A) < (B)
- (D) (E) < (C) < (D) < (A) < (B)

[Step-by-step solution ► prepwiser.in/questions/OWO-4djvU6](https://www.prepwiser.in/questions/OWO-4djvU6)

Q35 JEE Main 2024 · 9 Apr · Shift 2

Based on Heisenberg's uncertainty principle, the uncertainty in the velocity of the electron to be found within an atomic nucleus of diameter 10^{-15}m is _____ $\times 10^9\text{ms}^{-1}$ (nearest integer)

[Given : mass of electron = $9.1 \times 10^{-31}\text{kg}$, Plank's constant (h) = $6.626 \times 10^{-34}\text{Js}$] (Value of $\pi = 3.14$)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/xYnj0JCyV-](https://www.prepwiser.in/questions/xYnj0JCyV-)

Q36 JEE Main 2024 · 5 Apr · Shift 2

In an atom, total number of electrons having quantum numbers $n = 4$, $|m_l| = 1$ and $m_s = -\frac{1}{2}$ is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/6jGGkD_ha3](https://www.prepwiser.in/questions/6jGGkD_ha3)

Q37 JEE Main 2024 · 4 Apr · Shift 2

The maximum number of orbitals which can be identified with $n = 4$ and $m_l = 0$ is _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/Lpjfhvv1g8](https://www.prepwiser.in/questions/Lpjfhvv1g8)

Q38 JEE Main 2024 · 1 Feb · Shift 2

The number of radial node/s for $3p$ orbital is :

- (A) 3 (B) 2
(C) 1 (D) 4

Step-by-step solution ► [prepwiser.in/questions/bczbV44YuU](https://www.prepwiser.in/questions/bczbV44YuU)

Q39 JEE Main 2024 · 31 Jan · Shift 2

The four quantum numbers for the electron in the outer most orbital of potassium (atomic no. 19) are

- (A) $n = 3, l = 0, m = 1, s = +\frac{1}{2}$
(B) $n = 4, l = 0, m = 0, s = +\frac{1}{2}$
(C) $n = 2, l = 0, m = 0, s = +\frac{1}{2}$
(D) $n = 4, l = 2, m = -1, s = +\frac{1}{2}$

Step-by-step solution ► [prepwiser.in/questions/aVm2XNzCK0](https://www.prepwiser.in/questions/aVm2XNzCK0)

Q40 JEE Main 2024 · 29 Jan · Shift 1

The correct set of four quantum numbers for the valence electron of rubidium atom ($Z = 37$) is :

- (A) $5, 1, 1, +\frac{1}{2}$ (B) $5, 0, 0, +\frac{1}{2}$
(C) $5, 0, 1, +\frac{1}{2}$ (D) $5, 1, 0, +\frac{1}{2}$

Step-by-step solution ► [prepwiser.in/questions/CokjCjhgit](https://www.prepwiser.in/questions/CokjCjhgit)

Q41 JEE Main 2024 · 27 Jan · Shift 1

The number of electrons present in all the completely filled subshells having $n = 4$ and $s = +\frac{1}{2}$ is _____.
(Where n = principal quantum number and s = spin quantum number)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/LBHgh1fY6T](https://www.prepwiser.in/questions/LBHgh1fY6T)

Q42 JEE Main 2023 · 13 Apr · Shift 2

The orbital angular momentum of an electron in 3s orbital is $\frac{x\hbar}{2\pi}$. The value of x is _____ (nearest integer)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/D1m4AAvFhr](https://www.prepwiser.in/questions/D1m4AAvFhr)

Q43 JEE Main 2023 · 6 Apr · Shift 1

The wavelength of an electron of kinetic energy 4.50×10^{-29} J is _____ $\times 10^{-5}$ m. (Nearest integer)

Given : mass of electron is 9×10^{-31} kg, $h = 6.6 \times 10^{-34}$ J s

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/zkmlqTEKLT](https://www.prepwiser.in/questions/zkmlqTEKLT)

Q44 JEE Main 2023 · 30 Jan · Shift 2

Maximum number of electrons that can be accommodated in shell with $n = 4$ are:

- (A) 50 (B) 32
(C) 72 (D) 16

[Step-by-step solution ► prepwiser.in/questions/y2Debb1lp4](https://www.prepwiser.in/questions/y2Debb1lp4)

Q45 JEE Main 2023 · 30 Jan · Shift 2

The wave function (Ψ) of 2s is given by

$$\Psi_{2s} = \frac{1}{2\sqrt{2\pi}} \left(\frac{1}{a_0} \right)^{1/2} \left(2 - \frac{r}{a_0} \right) e^{-r/2a_0}$$

At $r = r_0$, radial node is formed. Thus, r_0 in terms of a_0

- (A) $r_0 = a_0$ (B) $r_0 = 4a_0$
(C) $r_0 = 2a_0$ (D) $r_0 = \frac{a_0}{2}$

[Step-by-step solution ► prepwiser.in/questions/mVcohcSxdT](https://www.prepwiser.in/questions/mVcohcSxdT)

Q46 JEE Main 2022 · 29 Jul · Shift 1

The minimum uncertainty in the speed of an electron in an one dimensional region of length $2a_0$ (Where a_0 = Bohr radius 52.9 pm) is _____ km s^{-1} .

(Given : Mass of electron = 9.1×10^{-31} kg, Planck's constant $h = 6.63 \times 10^{-34}$ Js)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/5_GHqH6P5](https://www.prepwiser.in/questions/5_GHqH6P5)

Q47 JEE Main 2022 · 29 Jul · Shift 2

Given below are the quantum numbers for 4 electrons.

- A. $n = 3, l = 2, m_l = 1, m_s = +1/2$
- B. $n = 4, l = 1, m_l = 0, m_s = +1/2$
- C. $n = 4, l = 2, m_l = -2, m_s = -1/2$
- D. $n = 3, l = 1, m_l = -1, m_s = +1/2$

The correct order of increasing energy is :

- (A) $D < B < A < C$
- (B) $D < A < B < C$
- (C) $B < D < A < C$
- (D) $B < D < C < A$

[Step-by-step solution ► prepwiser.in/questions/bXDZqFPtEO](https://www.prepwiser.in/questions/bXDZqFPtEO)

Q48 JEE Main 2022 · 25 Jul · Shift 1

Which of the following sets of quantum numbers is not allowed?

- (A) $n = 3, l = 2, m_l = 0, s = +\frac{1}{2}$
- (B) $n = 3, l = 2, m_l = -2, s = +\frac{1}{2}$
- (C) $n = 3, l = 3, m_l = -3, s = -\frac{1}{2}$
- (D) $n = 3, l = 0, m_l = 0, s = -\frac{1}{2}$

[Step-by-step solution ► prepwiser.in/questions/ppWYGHZVow](https://www.prepwiser.in/questions/ppWYGHZVow)

Q49 JEE Main 2022 · 28 Jun · Shift 2

Consider the following statements :

- (A) The principal quantum number 'n' is a positive integer with values of 'n' = 1, 2, 3, ...
- (B) The azimuthal quantum number 'l' for a given 'n' (principal quantum number) can have values as 'l' = 0, 1, 2, n
- (C) Magnetic orbital quantum number 'm_l' for a particular 'l' (azimuthal quantum number) has (2l + 1) values.
- (D) $\pm 1/2$ are the two possible orientations of electron spin.
- (E) For l = 5, there will be a total of 9 orbital

Which of the above statements are correct?

- (A) (A), (B) and (C)
- (B) (A), (C), (D) and (E)
- (C) (A), (C) and (D)
- (D) (A), (B), (C) and (D)

[Step-by-step solution ► prepwiser.in/questions/SXvDZ7H00m](https://www.prepwiser.in/questions/SXvDZ7H00m)

Q50 JEE Main 2022 · 27 Jun · Shift 2

Consider the following set of quantum numbers.

	n	l	m_l
A.	3	3	-3
B.	3	2	-2
C.	2	1	+1
D.	2	2	+2

The number of correct sets of quantum numbers is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/yHw2SVfO_U](https://www.prepwiser.in/questions/yHw2SVfO_U)

Q51 JEE Main 2022 · 24 Jun · Shift 1

Consider the following pairs of electrons

(A) (a) $n = 3, l = 1, m_l = 1, m_s = +\frac{1}{2}$

(b) $n = 3, l = 2, m_l = 1, m_s = +\frac{1}{2}$

(B) (a) $n = 3, l = 2, m_l = -2, m_s = -\frac{1}{2}$

(b) $n = 3, l = 2, m_l = -1, m_s = -\frac{1}{2}$

(C) (a) $n = 4, l = 2, m_l = 2, m_s = +\frac{1}{2}$

(b) $n = 3, l = 2, m_l = 2, m_s = +\frac{1}{2}$

The pairs of electrons present in degenerate orbitals is/are :

(A) Only (A)

(B) Only (B)

(C) Only (C)

(D) (B) and (C)

[Step-by-step solution ► prepwiser.in/questions/SdMUgwTBw5](https://www.prepwiser.in/questions/SdMUgwTBw5)

Q52 JEE Main 2021 · 31 Aug · Shift 2

The value of magnetic quantum number of the outermost electron of Zn^+ ion is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/4DC7ykfGQc](https://www.prepwiser.in/questions/4DC7ykfGQc)

Q53 JEE Main 2021 · 25 Jul · Shift 2

An accelerated electron has a speed of $5 \times 10^6 \text{ ms}^{-1}$ with an uncertainty of 0.02%. The uncertainty in finding its location while in motion is $x \times 10^{-9} \text{ m}$. The value of x is _____. (Nearest integer)

[Use mass of electron = $9.1 \times 10^{-31} \text{ kg}$, $h = 6.63 \times 10^{-34} \text{ Js}$, $\pi = 3.14$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/rsQdT6B_sc](https://www.prepwiser.in/questions/rsQdT6B_sc)

Q54 JEE Main 2021 · 20 Jul · Shift 1

The Azimuthal quantum number for the valence electrons of Ga^+ ion is _____.

(Atomic number of Ga = 31)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UWThAvSh5Q](https://www.prepwiser.in/questions/UWThAvSh5Q)

Q55 JEE Main 2021 · 17 Mar · Shift 1

A certain orbital has $n = 4$ and $m_l = -3$. The number of radial nodes in this orbital is _____. (Round off to the Nearest Integer).

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/GbVapIMkdb](https://www.prepwiser.in/questions/GbVapIMkdb)

Q56 JEE Main 2021 · 16 Mar · Shift 2

The number of orbitals with $n = 5$, $m_l = +2$ is _____. (Round off to the Nearest Integer).

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/0hTO92c9L](https://www.prepwiser.in/questions/0hTO92c9L)

Q57 JEE Main 2021 · 26 Feb · Shift 2

A ball weighing 10 g is moving with a velocity of 90 ms^{-1} . If the uncertainty in its velocity is 5%, then the uncertainty in its position is _____ $\times 10^{-33} \text{ m}$. (Rounded off to the nearest integer)

[Given : $h = 6.63 \times 10^{-34} \text{ Js}$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/kXyv9y4uRM](https://www.prepwiser.in/questions/kXyv9y4uRM)

Q58 JEE Main 2020 · 3 Sep · Shift 2

Consider the hypothetical situation where the azimuthal quantum number, l , takes values 0, 1, 2,, $n + 1$, where n is the principal quantum number. Then, the element with atomic number :

(A) 13 has a half-filled valence subshell

(B) 9 is the first alkali metal

(C) 8 is the first noble gas

(D) 6 has a 2p-valence subshell

[Step-by-step solution ► prepwiser.in/questions/Mz9HduVII6](https://www.prepwiser.in/questions/Mz9HduVII6)

Q59 JEE Main 2020 · 2 Sep · Shift 2

The number of subshells associated with $n = 4$ and $m = -2$ quantum numbers is

(A) 8

(B) 2

(C) 16

(D) 4

[Step-by-step solution ► prepwiser.in/questions/tiewr8pZYD](https://www.prepwiser.in/questions/tiewr8pZYD)

Q60 JEE Main 2020 · 7 Jan · Shift 1

The number of orbitals associated with quantum number $n = 5$, $m_s = +\frac{1}{2}$ is :

(A) 11

(B) 25

(C) 15

(D) 50

[Step-by-step solution ► prepwiser.in/questions/RI7ILHt3Fd](https://www.prepwiser.in/questions/RI7ILHt3Fd)

Q61 JEE Main 2025 · 24 Jan · Shift 2

For hydrogen atom, the orbital/s with lowest energy is/are :

- (A) 4s
- (B) $3p_x$
- (C) $3d_{x^2-y^2}$
- (D) $3d_{z^2}$
- (E) $4p_z$

Choose the correct answer from the options given below :

- (A) (A) only
- (B) (B) only
- (C) (B), (C) and (D) only
- (D) (A) and (E) only

[Step-by-step solution ► prepwiser.in/questions/x-vPR0mU_3](https://www.prepwiser.in/questions/x-vPR0mU_3)

Q62 JEE Main 2025 · 22 Jan · Shift 2

Given below are two statements :

Statement (I) : A spectral line will be observed for a $2p_x \rightarrow 2p_y$ transition.

Statement (II) : $2p_x$ and $2p_y$ are degenerate orbitals.

In the light of the above statements, choose the correct answer from the options given below :

- (A) Statement I is false but Statement II is true
- (B) Both Statement I and Statement II are false
- (C) Statement I is true but Statement II is false
- (D) Both Statement I and Statement II are true

[Step-by-step solution ► prepwiser.in/questions/UyLPsee_L2](https://www.prepwiser.in/questions/UyLPsee_L2)

Q63 JEE Main 2024 · 30 Jan · Shift 1

Given below are two statements :

Statement (I) : The orbitals having same energy are called as degenerate orbitals.

Statement (II) : In hydrogen atom, 3p and 3d orbitals are not degenerate orbitals.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Statement I is true but Statement II is false
- (B) Statement I is false but Statement II is true
- (C) Both Statement I and Statement II are false
- (D) Both Statement I and Statement II are true

[Step-by-step solution ► prepwiser.in/questions/OSZID1DGCm](https://www.prepwiser.in/questions/OSZID1DGCm)

Q64 JEE Main 2024 · 27 Jan · Shift 1

The electronic configuration for Neodymium is:

[Atomic Number for Neodymium 60]

- (A) $[\text{Xe}]4f^46s^2$
- (B) $[\text{Xe}]5f^47s^2$
- (C) $[\text{Xe}]4f^66s^2$
- (D) $[\text{Xe}]4f^15d^16s^2$

[Step-by-step solution ► prepwisser.in/questions/w1pSe6fQUW](https://www.prepwisser.in/questions/w1pSe6fQUW)

Q65 JEE Main 2023 · 15 Apr · Shift 1

The total number of isoelectronic species from the given set is _____.

$\text{O}^{2-}, \text{F}^-, \text{Al}, \text{Mg}^{2+}, \text{Na}^+, \text{O}^+, \text{Mg}, \text{Al}^{3+}, \text{F}$

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/2PhQmiVxYB](https://www.prepwisser.in/questions/2PhQmiVxYB)

Q66 JEE Main 2023 · 8 Apr · Shift 2

The number of atomic orbitals from the following having 5 radial nodes is _____.

7s, 7p, 6s, 8p, 8d

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/H3apxrcolA](https://www.prepwisser.in/questions/H3apxrcolA)

Q67 JEE Main 2023 · 1 Feb · Shift 2

Which one of the following sets of ions represents a collection of isoelectronic species?

(Given : Atomic Number : F : 9, Cl : 17, Na = 11, Mg = 12, Al = 13, K = 19, Ca = 20, Sc = 21)

- (A) $\text{N}^{3-}, \text{O}^{2-}, \text{F}^-, \text{S}^{2-}$
- (B) $\text{Ba}^{2+}, \text{Sr}^{2+}, \text{K}^+, \text{Ca}^{2+}$
- (C) $\text{Li}^+, \text{Na}^+, \text{Mg}^{2+}, \text{Ca}^{2+}$
- (D) $\text{K}^+, \text{Cl}^-, \text{Ca}^{2+}, \text{Sc}^{3+}$

[Step-by-step solution ► prepwisser.in/questions/mrEKnVqImt](https://www.prepwisser.in/questions/mrEKnVqImt)

Q68 JEE Main 2022 · 27 Jul · Shift 2

The correct decreasing order of energy for the orbitals having, following set of quantum numbers :

- (A) $n = 3, l = 0, m = 0$
- (B) $n = 4, l = 0, m = 0$
- (C) $n = 3, l = 1, m = 0$
- (D) $n = 3, l = 2, m = 1$

is :

- (A) $(D) > (B) > (C) > (A)$
- (B) $(B) > (D) > (C) > (A)$
- (C) $(C) > (B) > (D) > (A)$
- (D) $(B) > (C) > (D) > (A)$

[Step-by-step solution ► prepwisser.in/questions/EITIGnWIh7](https://www.prepwisser.in/questions/EITIGnWIh7)

Q69 JEE Main 2022 · 29 Jun · Shift 1

The electronic configuration of Pt (atomic number 78) is :

- (A) $[\text{Xe}] 4f^{14} 5d^9 6s^1$
- (B) $[\text{Kr}] 4f^{14} 5d^{10}$
- (C) $[\text{Xe}] 4f^{14} 5d^{10}$
- (D) $[\text{Xe}] 4f^{14} 5d^8 6s^2$

[Step-by-step solution ► prepwiser.in/questions/rHHWEg0f5e](https://www.prepwiser.in/questions/rHHWEg0f5e)

Q70 JEE Main 2022 · 25 Jun · Shift 1

The pair, in which ions are isoelectronic with Al^{3+} is :

- (A) Br^- and Be^{2+}
- (B) Cl^- and Li^+
- (C) S^{2-} and K^+
- (D) O^{2-} and Mg^{2+}

[Step-by-step solution ► prepwiser.in/questions/TKgFwaVKkv](https://www.prepwiser.in/questions/TKgFwaVKkv)

Q71 JEE Main 2021 · 1 Sep · Shift 2

Identify the element for which electronic configuration in +3 oxidation state is $[\text{Ar}]3d^5$:

- | | |
|--------|--------|
| (A) Ru | (B) Mn |
| (C) Co | (D) Fe |

[Step-by-step solution ► prepwiser.in/questions/grWDvxBC7a](https://www.prepwiser.in/questions/grWDvxBC7a)

Q72 JEE Main 2021 · 25 Jul · Shift 2

Number of electrons present in 4f orbital of Ho^{3+} ion is _____. (Given Atomic No. of Ho = 67)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/0FkZp5u_2Q](https://www.prepwiser.in/questions/0FkZp5u_2Q)

Q73 JEE Main 2021 · 22 Jul · Shift 2

Number of electrons that Vanadium ($Z = 23$) has in p-orbitals is equal to _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/n-pTD3Lcna](https://www.prepwiser.in/questions/n-pTD3Lcna)

Q74 JEE Main 2021 · 18 Mar · Shift 1

A certain orbital has no angular nodes and two radial nodes. The orbital is :

- | | |
|--------|--------|
| (A) 2s | (B) 3s |
| (C) 3p | (D) 2p |

[Step-by-step solution ► prepwiser.in/questions/Txuc9mB-IE](https://www.prepwiser.in/questions/Txuc9mB-IE)

Q75 JEE Main 2021 · 25 Feb · Shift 1

In which of the following pairs, the outer most electronic configuration will be the same?

- (A) Cr^+ and Mn^{2+}
- (B) Ni^{2+} and Cu^+
- (C) V^{2+} and Cr^+
- (D) Fe^{2+} and Co^+

[Step-by-step solution ► prepwisser.in/questions/rEFHotRg-q](https://www.prepwisser.in/questions/rEFHotRg-q)

Q76 JEE Main 2020 · 5 Sep · Shift 1

The correct electronic configuration and spin-only magnetic moment (BM) of Gd^{3+} ($Z = 64$), respectively, are :

- (A) $[\text{Xe}]5f^7$ and 8.9
- (B) $[\text{Xe}]4f^7$ and 7.9
- (C) $[\text{Xe}]5f^7$ and 7.9
- (D) $[\text{Xe}]4f^7$ and 8.9

[Step-by-step solution ► prepwisser.in/questions/sOz3GjMIzb](https://www.prepwisser.in/questions/sOz3GjMIzb)

Atomic Spectra · 24 PYQs

Q77 JEE Main 2025 · 23 Jan · Shift 1

Heat treatment of muscular pain involves radiation of wavelength of about 900 nm . Which spectral line of H atom is suitable for this?

Given : Rydberg constant $R_H = 10^5 \text{cm}^{-1}$, $h = 6.6 \times 10^{-34} \text{Js}$, $c = 3 \times 10^8 \text{m/s}$

- (A) Lyman series, $\infty \rightarrow 1$
- (B) Balmer series, $\infty \rightarrow 2$
- (C) Paschen series, $5 \rightarrow 3$
- (D) Paschen series, $\infty \rightarrow 3$

[Step-by-step solution ► prepwisser.in/questions/d-LAjpLfD_](https://www.prepwisser.in/questions/d-LAjpLfD_)

Q78 JEE Main 2024 · 8 Apr · Shift 2

Wavenumber for a radiation having $5800 \text{ \AA}$ wavelength is $x \times 10 \text{cm}^{-1}$ The value of x is _____. (Integer answer)

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/CQUZgWaixY](https://www.prepwisser.in/questions/CQUZgWaixY)

Q79 JEE Main 2024 · 31 Jan · Shift 1

The ionization energy of sodium in kJmol^{-1} , if electromagnetic radiation of wavelength 242nm is just sufficient to ionize sodium atom is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/9ckCZ4wdII](https://www.prepwisser.in/questions/9ckCZ4wdII)

Q80 JEE Main 2024 · 30 Jan · Shift 2

Number of spectral lines obtained in He^+ spectra, when an electron makes transition from fifth excited state to first excited state will be

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/Sm2u3YxuCT](https://www.prepwiser.in/questions/Sm2u3YxuCT)

Q81 JEE Main 2023 · 12 Apr · Shift 1

Values of work function (W_0) for a few metals are given below

Metal	Li	Na	K	Mg	Cu	Ag
W_0/eV	2.42	2.3	2.25	3.7	4.8	4.3

The number of metals which will show photoelectric effect when light of wavelength 400nm falls on it is _____

Given: $h = 6.6 \times 10^{-34}\text{Js}$

$c = 3 \times 10^8\text{ms}^{-1}$

$e = 1.6 \times 10^{-19}\text{C}$

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/mURsZue5Ho](https://www.prepwiser.in/questions/mURsZue5Ho)

Q82 JEE Main 2023 · 10 Apr · Shift 1

The number of incorrect statement/s about the black body from the following is _____

- (A) Emit or absorb energy in the form of electromagnetic radiation.
- (B) Frequency distribution of the emitted radiation depends on temperature.
- (C) At a given temperature, intensity vs frequency curve passes through a maximum value.
- (D) The maximum of the intensity vs frequency curve is at a higher frequency at higher temperature compared to that at lower temperature.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/-9QREegAED](https://www.prepwiser.in/questions/-9QREegAED)

Q83 JEE Main 2023 · 8 Apr · Shift 1

The number of following statement/s which is/are incorrect is _____

- (A) Line emission spectra are used to study the electronic structure
- (B) The emission spectra of atoms in the gas phase show a continuous spread of wavelength from red to violet
- (C) An absorption spectrum is like the photographic negative of an emission spectrum
- (D) The element helium was discovered in the sun by spectroscopic method

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/k2I0wdvpqO](https://www.prepwiser.in/questions/k2I0wdvpqO)

Q84 JEE Main 2023 · 31 Jan · Shift 1

Which transition in the hydrogen spectrum would have the same wavelength as the Balmer type transition from $n = 4$ to $n = 2$ of He^+ spectrum

(A) $n = 3$ to $n = 4$

(B) $n = 2$ to $n = 1$

(C) $n = 1$ to $n = 2$

(D) $n = 1$ to $n = 3$

Step-by-step solution ► [prepwiser.in/questions/mVXMFwNCEu](https://www.prepwiser.in/questions/mVXMFwNCEu)

Q85 JEE Main 2023 · 30 Jan · Shift 1

The energy of one mole of photons of radiation of frequency $2 \times 10^{12} \text{ Hz}$ in J mol^{-1} is _____. (Nearest integer)

[Given : $h = 6.626 \times 10^{-34} \text{ Js}$

$N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$]

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/sMzP-Avj-9](https://www.prepwiser.in/questions/sMzP-Avj-9)

Q86 JEE Main 2023 · 29 Jan · Shift 1

The shortest wavelength of hydrogen atom in Lyman series is λ . The longest wavelength is Balmer series of He^+ is

(A) $\frac{36\lambda}{5}$

(B) $\frac{5}{9\lambda}$

(C) $\frac{9\lambda}{5}$

(D) $\frac{5\lambda}{9}$

Step-by-step solution ► [prepwiser.in/questions/XT_81gWFq8](https://www.prepwiser.in/questions/XT_81gWFq8)

Q87 JEE Main 2023 · 24 Jan · Shift 1

If wavelength of the first line of the Paschen series of hydrogen atom is 720 nm, then the wavelength of the second line of this series is _____ nm. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/pej3Xd5LwL](https://www.prepwiser.in/questions/pej3Xd5LwL)

Q88 JEE Main 2022 · 28 Jul · Shift 2

If the wavelength for an electron emitted from H-atom is $3.3 \times 10^{-10} \text{ m}$, then energy absorbed by the electron in its ground state compared to minimum energy required for its escape from the atom, is _____ times. (Nearest integer)

[Given : $h = 6.626 \times 10^{-34} \text{ Js}$]

Mass of electron = $9.1 \times 10^{-31} \text{ kg}$

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/Jn_xrXM9uE](https://www.prepwiser.in/questions/Jn_xrXM9uE)

Q89 JEE Main 2022 · 25 Jul · Shift 2

When the excited electron of a H atom from $n = 5$ drops to the ground state, the maximum number of emission lines observed are _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwiser.in/questions/R05oLUtsnu](https://www.prepwiser.in/questions/R05oLUtsnu)

Q90 JEE Main 2022 · 28 Jun · Shift 1

If the work function of a metal is 6.63×10^{-19} J, the maximum wavelength of the photon required to remove a photoelectron from the metal is _____ nm. (Nearest integer)

[Given : $h = 6.63 \times 10^{-34}$ J s, and $c = 3 \times 10^8$ m s $^{-1}$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/UroOhFrgVN](https://www.prepwiser.in/questions/UroOhFrgVN)

Q91 JEE Main 2022 · 24 Jun · Shift 2

The energy of one mole of photons of radiation of wavelength 300 nm is

(Given : $h = 6.63 \times 10^{-34}$ J s, $N_A = 6.02 \times 10^{23}$ mol $^{-1}$, $c = 3 \times 10^8$ m s $^{-1}$)

(A) 235 kJ mol $^{-1}$

(B) 325 kJ mol $^{-1}$

(C) 399 kJ mol $^{-1}$

(D) 435 kJ mol $^{-1}$

[Step-by-step solution ► prepwiser.in/questions/ZF77YVwgoE](https://www.prepwiser.in/questions/ZF77YVwgoE)

Q92 JEE Main 2021 · 1 Sep · Shift 2

A 50 watt bulb emits monochromatic red light of wavelength of 795 nm. The number of photons emitted per second by the bulb is $x \times 10^{20}$. The value of x is _____. [Given : $h = 6.63 \times 10^{-34}$ Js and $c = 3.0 \times 10^8$ ms $^{-1}$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/BCEwuPWLtv](https://www.prepwiser.in/questions/BCEwuPWLtv)

Q93 JEE Main 2021 · 27 Aug · Shift 2

The number of photons emitted by a monochromatic (single frequency) infrared range finder of power 1 mW and wavelength of 1000 nm, in 0.1 second is $x \times 10^{13}$. The value of x is _____. (Nearest integer)

($h = 6.63 \times 10^{-34}$ Js, $c = 3.00 \times 10^8$ ms $^{-1}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ehPzrRtrKe](https://www.prepwiser.in/questions/ehPzrRtrKe)

Q94 JEE Main 2021 · 26 Aug · Shift 2

A metal surface is exposed to 500 nm radiation. The threshold frequency of the metal for photoelectric current is 4.3×10^{14} Hz. The velocity of ejected electron is _____ $\times 10^5$ ms $^{-1}$ (Nearest integer)

[Use : $h = 6.63 \times 10^{-34}$ Js, $m_e = 9.0 \times 10^{-31}$ kg]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/pv6mO_SIEk](https://www.prepwiser.in/questions/pv6mO_SIEk)

Q95 JEE Main 2021 · 16 Mar · Shift 1

When light of wavelength 248 nm falls on a metal of threshold energy 3.0 eV, the de-Broglie wavelength of emitted electrons is _____ Å. (Round off to the Nearest Integer).

[Use : $\sqrt{3} = 1.73$, $h = 6.63 \times 10^{-34}$ Js

$m_e = 9.1 \times 10^{-31}$ kg; $c = 3.0 \times 10^8$ ms $^{-1}$; $1\text{eV} = 1.6 \times 10^{-19}$ J]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/ivEXhSvYFI](https://www.prepwiser.in/questions/ivEXhSvYFI)

Q96 JEE Main 2021 · 25 Feb · Shift 2

Electromagnetic radiation of wavelength 663 nm is just sufficient to ionise the atom of metal A. The ionization energy of metal A in kJ mol $^{-1}$ is _____. (Rounded off to the nearest integer)

[$h = 6.63 \times 10^{-34}$ Js, $c = 3.00 \times 10^8$ ms $^{-1}$, $N_A = 6.02 \times 10^{23}$ mol $^{-1}$]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/bUivEcoR-r](https://www.prepwiser.in/questions/bUivEcoR-r)

Q97 JEE Main 2020 · 4 Sep · Shift 1

The region in the electromagnetic spectrum where the Balmar series lines appear is :

- (A) Microwave (B) Ultraviolet
(C) Visible (D) Infrared

[Step-by-step solution ► prepwiser.in/questions/0VcyslVdSZ](https://www.prepwiser.in/questions/0VcyslVdSZ)

Q98 JEE Main 2020 · 4 Sep · Shift 2

The shortest wavelength of H atom in the Lyman series is λ_1 . The longest wavelength in the Balmar series of He $^+$ is :

- (A) $\frac{5\lambda_1}{9}$ (B) $\frac{36\lambda_1}{5}$
(C) $\frac{27\lambda_1}{5}$ (D) $\frac{9\lambda_1}{5}$

[Step-by-step solution ► prepwiser.in/questions/kOp0yNOUdu](https://www.prepwiser.in/questions/kOp0yNOUdu)

Q99 JEE Main 2020 · 2 Sep · Shift 2

The work function of sodium metal is 4.41×10^{-19} J. If photons of wavelength 300 nm are incident on the metal, the kinetic energy of the ejected electrons will be ($h = 6.63 \times 10^{-34}$ J s; $c = 3 \times 10^8$ m/s) _____ $\times 10^{-21}$ J.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/FPK6uhJ0qY](https://www.prepwiser.in/questions/FPK6uhJ0qY)

Q100 JEE Main 2020 · 8 Jan · Shift 1

For the Balmer series in the spectrum of H atom,

$\bar{\nu} = R_H \left\{ \frac{1}{n_1^2} - \frac{1}{n_2^2} \right\}$, the correct statements among (I) to (IV) are :

- (I) As wavelength decreases, the lines in the series converge
- (II) The integer n_1 is equal to 2
- (III) The lines of longest wavelength corresponds to $n_2 = 3$
- (IV) The ionization energy of hydrogen can be calculated from wave number of these lines

(A) (II), (III), (IV)

(B) (I), (II), (III)

(C) (I), (III), (IV)

(D) (I), (II), (IV)

Step-by-step solution ► [prepwisar.in/questions/kdUXF2F6EG](https://www.prepwisar.in/questions/kdUXF2F6EG)

Aufbau, Pauli and Hund · 5 PYQs

Q101 JEE Main 2025 · 7 Apr · Shift 2

The extra stability of half-filled subshell is due to :

- (A) Symmetrical distribution of electrons
- (B) Smaller coulombic repulsion energy
- (C) The presence of electrons with the same spin in non-degenerate orbitals
- (D) Larger exchange energy
- (E) Relatively smaller shielding of electrons by one another

Identify the correct statements :

(A) (B), (D) and (E) only

(B) (A), (B), (D) and (E) only

(C) (B), (C) and (D) only

(D) (A), (B) and (D) only

Step-by-step solution ► [prepwisar.in/questions/8TtIyoJE91](https://www.prepwisar.in/questions/8TtIyoJE91)

Q102 JEE Main 2023 · 31 Jan · Shift 2

Arrange the following orbitals in decreasing order of energy.

A. $n = 3, l = 0, m = 0$

B. $n = 4, l = 0, m = 0$

C. $n = 3, l = 1, m = 0$

D. $n = 3, l = 2, m = 1$

The correct option for the order is :

(A) $B > D > C > A$

(B) $A > C > B > D$

(C) $D > B > A > C$

(D) $D > B > C > A$

Step-by-step solution ► [prepwisar.in/questions/nLDqIhY9p7](https://www.prepwisar.in/questions/nLDqIhY9p7)

Q103 JEE Main 2022 · 27 Jul · Shift 1

Given below are two statements. One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Energy of 2s orbital of hydrogen atom is greater than that of 2s orbital of lithium.
Reason R: Energies of the orbitals in the same subshell decrease with increase in the atomic number.
In the light of the above statements, choose the correct answer from the options given below.

- (A) Both A and R are true and R is the correct explanation of A.
- (B) Both A and R are true but R is NOT the correct explanation of A.
- (C) A is true but R is false.
- (D) A is false but R is true.

[Step-by-step solution ► prepwisser.in/questions/U_vv26FZtR](https://www.prepwisser.in/questions/U_vv26FZtR)

Q104 JEE Main 2022 · 29 Jun · Shift 1

Which of the following statements are correct?

- (A) The electronic configuration of Cr is $[\text{Ar}] 3d^5 4s^1$.
- (B) The magnetic quantum number may have a negative value.
- (C) In the ground state of an atom, the orbitals are filled in order of their increasing energies.
- (D) The total number of nodes are given by $n - 2$.

Choose the most appropriate answer from the options given below :

- (A) (A), (C) and (D) only
- (B) (A) and (B) only
- (C) (A) and (C) only
- (D) (A), (B) and (C) only

[Step-by-step solution ► prepwisser.in/questions/J-VF28nF_c](https://www.prepwisser.in/questions/J-VF28nF_c)

Q105 JEE Main 2020 · 5 Sep · Shift 1

In the sixth period, the orbitals that are filled are :

- (A) 6s, 5d, 5f, 6p
- (B) 6s, 4f, 5d, 6p
- (C) 6s, 6p, 6d, 6f
- (D) 6s, 5f, 6d, 6p

[Step-by-step solution ► prepwisser.in/questions/-KdABU2VYO](https://www.prepwisser.in/questions/-KdABU2VYO)

Shapes of Orbitals · 5 PYQs

Q106 JEE Main 2023 · 25 Jan · Shift 2

The number of given orbitals which have electron density along the axis is _____

$p_x, p_y, p_z, d_{xy}, d_{yz}, d_{xz}, d_{z^2}, d_{x^2-y^2}$

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/5dAnpae6s9](https://www.prepwisser.in/questions/5dAnpae6s9)

Q107 JEE Main 2022 · 30 Jun · Shift 1

The number of radial nodes and total number of nodes in 4p orbital respectively are :

- (A) 2 and 3
- (B) 2 and 2
- (C) 3 and 4
- (D) 4 and 4

[Step-by-step solution ► prepwisser.in/questions/CK1eOABmHD](https://www.prepwisser.in/questions/CK1eOABmHD)

Q108 JEE Main 2022 · 26 Jun · Shift 2

The number of radial and angular nodes in 4d orbital are, respectively

- (A) 1 and 2 (B) 3 and 2
(C) 1 and 0 (D) 2 and 1

[Step-by-step solution ► prepwiser.in/questions/L-KI7JA2HK](https://www.prepwiser.in/questions/L-KI7JA2HK)

Q109 JEE Main 2021 · 26 Feb · Shift 1

The orbital having two radial as well as two angular nodes is :

- (A) 3p (B) 5d
(C) 4d (D) 4f

[Step-by-step solution ► prepwiser.in/questions/Hqf_G2EVkV](https://www.prepwiser.in/questions/Hqf_G2EVkV)

Q110 JEE Main 2020 · 5 Sep · Shift 2

The correct statement about probability density (except at infinite distance from nucleus) is :

- (A) It can be zero for 1s orbital (B) It can be zero for 3p orbital
(C) It can never be zero for 2s orbital (D) It can negative for 2p orbital

[Step-by-step solution ► prepwiser.in/questions/zai9zFYgsp](https://www.prepwiser.in/questions/zai9zFYgsp)

Discovery of Subatomic Particles · 11 PYQs

Q111 JEE Main 2024 · 5 Apr · Shift 1

The incorrect postulates of the Dalton's atomic theory are :

- (A) Atoms of different elements differ in mass.
(B) Matter consists of divisible atoms.
(C) Compounds are formed when atoms of different element combine in a fixed ratio.
(D) All the atoms of given element have different properties including mass.
(E) Chemical reactions involve reorganisation of atoms.

Choose the correct answer from the options given below :

- (A) (B), (D) only (B) (A), (B), (D) only
(C) (B), (D), (E) only (D) (C), (D), (E) only

[Step-by-step solution ► prepwiser.in/questions/GYjpJq_qAH](https://www.prepwiser.in/questions/GYjpJq_qAH)

Q112 JEE Main 2024 · 4 Apr · Shift 2

Choose the Incorrect Statement about Dalton's Atomic Theory

- (A) Compounds are formed when atoms of different elements combine in any ratio.
(B) Matter consists of indivisible atoms.
(C) chemical reactions involve reorganization of atoms
(D) All the atoms of a given element have identical properties including identical mass.

[Step-by-step solution ► prepwiser.in/questions/0yA8PtAsaI](https://www.prepwiser.in/questions/0yA8PtAsaI)

Q113 JEE Main 2023 · 11 Apr · Shift 1

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : In the photoelectric effect, the electrons are ejected from the metal surface as soon as the beam of light of frequency greater than threshold frequency strikes the surface.

Reason R : When the photon of any energy strikes an electron in the atom, transfer of energy from the photon to the electron takes place.

In the light of the above statements, choose the most appropriate answer from the options given below :

- (A) Both A and R are correct and R is the correct explanation of A
- (B) A is not correct but R is correct
- (C) A is correct but R is not correct
- (D) Both A and R are correct but R is NOT the correct explanation of A

[Step-by-step solution ► prepwiser.in/questions/a4rYkp1s4f](https://www.prepwiser.in/questions/a4rYkp1s4f)

Q114 JEE Main 2023 · 6 Apr · Shift 1

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A : Loss of electron from hydrogen atom results in nucleus of $\sim 1.5 \times 10^{-3} \text{ pm}$ size.

Reason R : Proton (H^+) always exists in combined form.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (A) Both **A** and **R** are correct and **R** is the correct explanation of **A**
- (B) A is correct but R is not correct
- (C) A is not correct but R is correct
- (D) Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**

[Step-by-step solution ► prepwiser.in/questions/lrbzIJqwX9](https://www.prepwiser.in/questions/lrbzIJqwX9)

Q115 JEE Main 2023 · 1 Feb · Shift 1

Electrons in a cathode ray tube have been emitted with a velocity of 1000 m s^{-1} . The number of following statements which is/are true about the emitted radiation is _____.

Given : $h = 6 \times 10^{-34} \text{ Js}$, $m_e = 9 \times 10^{-31} \text{ kg}$.

- (A) The de-Broglie wavelength of the electron emitted is 666.67 nm .
- (B) The characteristic of electrons emitted depend upon the material of the electrodes of the cathode ray tube.
- (C) The cathode rays start from cathode and move towards anode.
- (D) The nature of the emitted electrons depends on the nature of the gas present in cathode ray tube.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/kaA2XQyAaU](https://www.prepwiser.in/questions/kaA2XQyAaU)

Q116 JEE Main 2022 · 26 Jul · Shift 2

Consider an imaginary ion ${}_{22}^{48}\text{X}^{3-}$. The nucleus contains 'a' % more neutrons than the number of electrons in the ion. The value of 'a' is _____. [nearest integer]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/IQOgGvcf11](https://www.prepwiser.in/questions/IQOgGvcf11)

Q117 JEE Main 2022 · 27 Jun · Shift 1

If the uncertainty in velocity and position of a minute particle in space are, $2.4 \times 10^{-26} \text{ (m s}^{-1}\text{)}$ and 10^{-7} (m) respectively. The mass of the particle in g is _____. (Nearest integer)

(Given : $h = 6.626 \times 10^{-34} \text{ Js}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/m641f0pit5](https://www.prepwisser.in/questions/m641f0pit5)

Q118 JEE Main 2022 · 25 Jun · Shift 2

The minimum energy that must be possessed by photons in order to produce the photoelectric effect with platinum metal is :

[Given : The threshold frequency of platinum is $1.3 \times 10^{15} \text{ s}^{-1}$ and $h = 6.6 \times 10^{-34} \text{ J s}$.]

(A) $3.21 \times 10^{-14} \text{ J}$

(B) $6.24 \times 10^{-16} \text{ J}$

(C) $8.58 \times 10^{-19} \text{ J}$

(D) $9.76 \times 10^{-20} \text{ J}$

[Step-by-step solution ► prepwisser.in/questions/CB9sK6Wp0L](https://www.prepwisser.in/questions/CB9sK6Wp0L)

Q119 JEE Main 2021 · 27 Jul · Shift 2

If the Thompson model of the atom was correct, then the result of Rutherford's gold foil experiment would have been :

(A) All of the α -particles pass through the gold foil without decrease in speed.

(B) α -particles are deflected over a wide range of angles.

(C) All α -particles get bounced back by 180°

(D) α -particles pass through the gold foil deflected by small angles and with reduced speed.

[Step-by-step solution ► prepwisser.in/questions/FAVS-cSy3P](https://www.prepwisser.in/questions/FAVS-cSy3P)

Q120 JEE Main 2021 · 25 Jul · Shift 1

A source of monochromatic radiation of wavelength 400 nm provides 1000 J of energy in 10 seconds. When this radiation falls on the surface of sodium, $x \times 10^{20}$ electrons are ejected per second. Assume that wavelength 400 nm is sufficient for ejection of electron from the surface of sodium metal. The value of x is _____. (Nearest integer)

($h = 6.626 \times 10^{-34} \text{ Js}$)

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/li2eCbsMjg](https://www.prepwisser.in/questions/li2eCbsMjg)

Q121 JEE Main 2020 · 7 Jan · Shift 1

Amongst the following statements, that which was not proposed by Dalton was :

- (A) Matter consists of indivisible atoms all the atoms of a given element have.
- (B) Chemical reactions involve reorganization of atoms. These are neither created nor destroyed in a chemical reaction.
- (C) When gases combine or reproduced in a chemical reaction they do so in a simple ratio by volume provided all gases are the same T & P.
- (D) Identical properties including identical mass. Atoms of different element differ in mass.

[Step-by-step solution ► prepwiser.in/questions/KkVu0J-xee](https://www.prepwiser.in/questions/KkVu0J-xee)

Electronic Configuration · 6 PYQs

Q122 JEE Main 2025 · 22 Jan · Shift 2

Niobium (Nb) and ruthenium (Ru) have " x " and " y " number of electrons in their respective 4 d orbitals. The value of $x + y$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/u_zWsUezM-](https://www.prepwiser.in/questions/u_zWsUezM-)

Q123 JEE Main 2024 · 9 Apr · Shift 2

The electronic configuration of Einsteinium is :

(Given atomic number of Einsteinium = 99)

- (A) $[\text{Rn}]5f^{13}6d^07s^2$
- (B) $[\text{Rn}]5f^{12}6d^07s^2$
- (C) $[\text{Rn}]5f^{11}6d^07s^2$
- (D) $[\text{Rn}]5f^{10}6d^07s^2$

[Step-by-step solution ► prepwiser.in/questions/OL8z3todUu](https://www.prepwiser.in/questions/OL8z3todUu)

Q124 JEE Main 2024 · 27 Jan · Shift 2

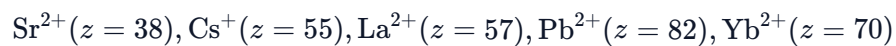
Choose the correct option having all the elements with d^{10} electronic configuration from the following :

- (A) ^{46}Pd , ^{28}Ni , ^{26}Fe , ^{24}Cr
- (B) ^{29}Cu , ^{30}Zn , ^{48}Cd , ^{47}Ag
- (C) ^{27}Co , ^{28}Ni , ^{26}Fe , ^{24}Cr
- (D) ^{28}Ni , ^{24}Cr , ^{26}Fe , ^{29}Cu

[Step-by-step solution ► prepwiser.in/questions/Yyz-j6yR0n](https://www.prepwiser.in/questions/Yyz-j6yR0n)

Q125 JEE Main 2024 · 27 Jan · Shift 2

Total number of ions from the following with noble gas configuration is _____.



and $\text{Fe}^{2+}(z = 26)$

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/g4Za0UzgBu](https://www.prepwiser.in/questions/g4Za0UzgBu)

Q126 JEE Main 2023 · 24 Jan · Shift 2

The number of s-electrons present in an ion with 55 protons in its unipositive state is

- | | |
|--------|-------|
| (A) 10 | (B) 9 |
| (C) 12 | (D) 8 |

[Step-by-step solution ► prepwiser.in/questions/jIGvH_9hwF](https://www.prepwiser.in/questions/jIGvH_9hwF)

Q127 JEE Main 2021 · 26 Aug · Shift 1

The number of 4f electrons in the ground state electronic configuration of Gd^{2+} is _____.

[Atomic number of Gd = 64]

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/d0qil3N5Li](https://www.prepwiser.in/questions/d0qil3N5Li)

Answer key — Atomic Structure

Numbers match the question numbers above. For full working, open the solution link under each question.

1	54	2	A	3	C	4	A	5	D	6	B	7	34	8	658
9	22	10	8	11	C	12	C	13	C	14	270	15	D	16	1758
17	B	18	4	19	3155	20	C	21	D	22	6	23	A	24	2
25	D	26	C	27	C	28	D	29	B	30	B	31	B	32	D
33	A	34	C	35	58	36	6	37	4	38	C	39	B	40	B
41	16	42	0	43	7	44	B	45	C	46	548	47	B	48	C
49	C	50	2	51	B	52	0	53	58	54	0	55	0	56	3
57	1	58	A	59	B	60	B	61	C	62	A	63	A	64	A
65	5	66	3	67	D	68	A	69	A	70	D	71	D	72	10
73	12	74	B	75	A	76	B	77	D	78	1724	79	494	80	10
81	3	82	0	83	1	84	B	85	798	86	C	87	492	88	2
89	10	90	300	91	C	92	2	93	50	94	5	95	9	96	181
97	C	98	D	99	222	100	B	101	B	102	D	103	A	104	D
105	B	106	5	107	A	108	A	109	B	110	B	111	A	112	A
113	C	114	D	115	2	116	4	117	22	118	C	119	D	120	2
121	C	122	11	123	C	124	B	125	2	126	A	127	7		

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