Chapter 02

Atomic Structure

NEET–FLASHBACK

Q.1 Maximum number of electrons in a subshell with $\ell = 3$ and $n = 4$ is: **[AIPMT PRE-2012]**

(1) 10   (2) 12   (3) 14   (4) 16

Q.2 The correct set of four quantum numbers for the valence electron of rubidium atom ($Z = 37$) is:- **[AIPMT PRE-2012]**

(1) 5, 0, 0, + ½   (2) 5, 1, 0, + ½

(3) 5, 1, 1, + ½   (4) 6, 0, 0 + ½

Q.3 The orbital angular momentum of a p-electron is given as :- **[AIPMT PRE-2012]**

(1) $\sqrt{\dfrac{3}{2}}\dfrac{h}{\pi}$ (2) $\sqrt{6}\cdot\dfrac{h}{2\pi}$

(3) $\dfrac{h}{\sqrt{2}\,\pi}$ (4) $\sqrt{3}\dfrac{h}{2\pi}$

Q.4 Threshold frequency of a metal is $5\times10^{13}\,\text{sec}^{-1}$ upon which $1 \times 10^{+14}\ \text{sec}^{-1}$ frequency light is focused then maximum kinetic energy of emitted electron:- **[AIPMT PRE-2012]**

(1) 3.3×10^{-21} (2) 3.3×10^{-20}

(3) 6.6×10^{-21} (4) 6.6×10^{-20}

Q.5 In Bohr's orbit $\dfrac{nh}{2\pi}$ indicates :- **[AIPMT PRE-2012]**

(1) Momentum

(2) Kinetic energy

(3) Potential energy

(4) Angular momentum

Q.6 The value of Planck's constant is 6.63×10^{-34} Js. The speed of light is $3 \times 10^{17}\ \text{nms}^{-1}$. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of $6 \times 10^{15}\ \text{s}^{-1}$? **[NEET UG-2013]**

(1) 75   (2) 10   (3) 25   (4) 50

Q.7 Based on equation $E = -2.178 \times 10^{-1}\text{Js}\left(\dfrac{Z^2}{n^2}\right)$ certain conclusions are written. Which of them is not correct? **[NEET UG-2013]**

(1) For $n = 1$, the electron has a more negative energy than it does for $n = 6$ which means that the electron is more lossely bound int he smallest allowed orbit.

(2) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infintite distance form the nucleus.

(3) Larger the value of n, the larger is the orbit radius

(4) Equation can be used to calculate the change in energy when the electron change orbit.

Q.8 What is the maximum number of electrons that can be associated with the following set of quantum numbers? $n = 3$; $l = 1$ and $m = -1$ **[NEET UG-2013]**

(1) 2   (2) 10   (3) 6   (4) 4

Q.9 A particle is moving with 3 times faster than speed of e^-. Ratio of wavelength of particle & electron is 1.8×10^{-4} then particle L is:- **[NEET UG-2013]**

(1) Neutron   (2) α- particle

(3) Deutron   (4) Tritium

Q.10 What is the maximum number of orbitals that can be identified with the following quantum numbers? (n = 3, $\ell = 1$, $m_\ell = 0$) **[NEET-2014]**

(1) 1 (2) 2 (3) 3 (4) 4

Q.11 Calculate the energy in joule corresponding to light of wavelength 45 nm :

(Planck's constant h = 6.63×10^{-34} Js ; speed of light c = 3×10^8 ms^{-1}) **[NEET-2014]**

(1) 6.67×10^{15} (2) 6.67×10^{11}

(3) 4.42×10^{-15} (4) 4.42×10^{-18}

Q.12 Magnetic moment 2.83 BM is given by which of the following ions?
(At. nos. Ti = 22, Cr = 24, Mn = 25, Ni = 28) :-
  [NEET-2014]

(1) Ti^{3+} (2) Ni^{2+} (3) Cr^{3+} (4) Mn^{2+}

Q.13 The energy of an electron of $2p_y$ orbital is
  [NEET-2014]

(1) greater than $2p_x$ orbital

(2) Less than $2p_z$ orbital

(3) same as that of $2p_x$ and $2p_z$ orbital

(4) Equal to 2s orbital

Q.14 Which of the following pairs of ions are isoelectronic and isostructural? **[NEET-2015]**

(1) ClO_3^-, CO_3^{2-} (2) SO_3^{2-}, NO_3^-

(3) ClO_3^-, SO_3^{2-} (4) CO_3^{2-}, SO_3^{2-}

Q.15 The number of d-electrons in Fe^{2+}(Z = 26) is not equal to the number of electrons in which one of the following? **[NEET-2015]**

(1) p-electrons in Cl (Z=17)

(2) d-electrons in Fe (Z=26)

(3) p-electrons in Ne (Z=10)

(4) s-electrons in Mg (Z=12)

Q.16 The angular momentum of electron in 'd' orbital is equal to :- **[NEET-2015]**

(1) $\sqrt{2}\hbar$ (2) $2\sqrt{3}\hbar$

(3) $0\hbar$ (4) $\sqrt{6}\hbar$

Q.17 Which is the correct order of increasing energy of the listed orbitals in the atom of titanium?
(At. no. Z = 22) **[NEET-2015]**

(1) 3s 3p 3d 4s   (2) 3s 3p 4s 3d

(3) 3s 4s 3p 3d   (4) 4s 3s 3p 3d

Q.18 In which transition of hydrogen atom have same wavlength as in Balmer series transition of He$^+$ ion(n =4 to n = 2) **[NEET-2015]**

(1) 4 to 2   (2) 3 to 2

(3) 2 to 1   (4) 4 to 1

Q.19 The electronic configurations of Eu(Atomic No. 63), Gd(Atomic No 64) and Tb (Atomic No. 65) are
  [NEET-2016]

(1) $[Xe]4f^7 6s^2$, $[Xe]4f^8 6s^2$ and $[Xe]4f^8 5d^1 6s^2$

(2) $[Xe]4f^7 5d^1 6s^2$, $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^9 6s^2$

(3) $[Xe]4f^6 5d^1 6s^2$, $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^8 5d^1 6s^2$

(4) $[Xe]4f^7 6s^2$, $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^9 6s^2$

Q.20 Two electrons occupying the same orbital are distinguished by **[NEET-2016]**

(1) Principal quantum number

(2) Magnetic quantum number

(3) Azimuthal quantum number

(4) Spin quantum number

Q.21 Which of the following pairs of d-orbitals will have electron density along the axis?
  [NEET-2016]

(1) $d_{z^2}, d_{x^2-y^2}$ (2) $d_{xy}, d_{x^2-y^2}$

(3) d_{z^2}, d_{xz} (4) d_{xz}, d_{yz}

Q.22 How many electrons can fit in the orbital for which n = 3 and l = 1? **[NEET-2016]**

(1) 10 (2) 14 (3) 2 (4) 6

Q.23 Which one is the wrong statement?
  [NEET-2017]

(1) de–Broglie's wavelength is given by $\lambda = \dfrac{h}{mv}$; where m = mass of the particle, v = group velocity of the particle.
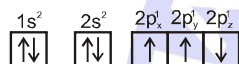
(2) The uncertainty principle is $\Delta E \times \Delta t \geq \dfrac{h}{4\pi}$.

(3) Half filled and fully filled orbitals have greater stability due to greater exchange energy, greater symmetry and more balanced arrangement.

(4) The energy of 2s orbital is less than the energy of 2p orbital in case of Hydrogen like atoms.

Q.24 Which one is a wrong statement ? **[NEET-2018]**

(1) The electronic configuration of N atom is

(2) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

(3) Total orbital angular momentum of electron in 's' orbital is equal to zero.

(4) The value of m for d_{z^2} is zero.

Q.25 Match the metal ions given in Column I with the spin magnetic moments of the ions given in column II and assign the correct code:
[NEET-2019]

Column I	Column II
a. Co^{3+}	i. $\sqrt{8}$ B.M.
b. Cr^{3+}	ii. $\sqrt{35}$ B.M.
c. Fe^{3+}	iii. $\sqrt{3}$ B.M.
d. Ni^{2+}	iv. $\sqrt{24}$ B.M.
	v. $\sqrt{15}$ B.M.

	a	b	c	d
(1)	iv	i	ii	iii
(2)	i	ii	iii	iv
(3)	iv	v	ii	i
(4)	iii	v	i	ii

Q.26 Wave length of particular transition for H atom is 400 nm. What can be wavelength of He^+ for same transition: **[NEET-2019]**

(1) 400 nm (2) 100 nm
(3) 1600 nm (4) 200 nm

Q.27 A gas metal in bivalent state have approximately $23e^-$ what is spin magnetic moment in elemental state : **[NEET-2019]**

(1) 2.87 (2) 5.5 (3) 5.9 (4) 4.9

Q.28 What is maximum wavelength of line of Balmer series of Hydrogen spectrum ($R = 1.09 \times 10^7$ m^{-1}) :
[NEET-2019]

(1) 400 nm (2) 654 nm
(3) 486 nm (4) 434 nm

Q.29 In second orbit of H atom what is velocity of e^-
[NEET-2019]

(1) 2.18×10^6 m/sec
(2) 3.27×10^6 m/sec
(3) 10.9×10^5 m/sec
(4) 21.8×10^6 m/sec

Q.30 When on metal sheet fall λ_1 light will eject electron with v_1 velocity and with λ_2 light eject electron of v_2 velocity, what is $v_2^2 - v_1^2$ value
[NEET-2019]

(1) $\dfrac{2hc}{m}\left(\dfrac{1}{\lambda_2} - \dfrac{1}{\lambda_1}\right)$ (2) $\dfrac{hc}{m}\left(\dfrac{1}{\lambda_2} - \dfrac{1}{\lambda_1}\right)$

(3) $\dfrac{2hc}{m}\left(\dfrac{1}{\lambda_1} - \dfrac{1}{\lambda_2}\right)$ (4) $\dfrac{m}{2hc}\left(\dfrac{1}{\lambda_2} - \dfrac{1}{\lambda_1}\right)$

Q.31 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is :
[NEET-2019]

(1) 6p > 5f > 4d > 5p (2) 5f > 6p > 4d > 5p
(3) 5f > 6p > 5p > 4d (4) 6p > 5f > 5p > 4d

Q.32 Which of the following series of transitions in the spectrum of hydrogen atom falls in visible region ? **[NEET-2019]**

(1) Paschen series   (2) Brackett series

(3) Lyman series   (4) Balmer series

Q.33 The number of protons, neutrons and electrons in $^{175}_{71}Lu$, respectively, are : **[NEET-2020]**

(1) 104, 71 and 71   (2) 71, 71and 104

(3) 175, 104 and 71   (4) 71, 104 and 71

Q.34 The number of angular nodes and radial nodes in 3s orbital are **[NEET Re-2020]**

(1) 1 and 0, respectively

(2) 3 and 0, respectively

(3) 0 and 1, respectively

(4) 0 and 2, respectively

Q.35 Tritium, a radioactive isotope of hydrogen, emits which of the following particles ?

[NEET-2021]

(1) Beta (β^-) (2) Alpha (α)

(3) Gamma (γ) (4) Neutron (n)

Q.36 A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is :

[speed of light, $c = 3.0 \times 10^8$ ms^{-1}]

[NEET -2021]

(1) 219.3 m   (2) 219.2 m

(3) 2192 m   (4) 21.92 cm

Q.37 If radius of second Bohr orbit of the He$^+$ ion is 105.8 pm, what is the radius of third Bohr orbit of Li^{+2} ion ? **[NEET-2022]**

(1) 158.7 pm   (2) 15.87 pm

(3) 1.587 pm   (4) 185.7 Å

Q.38 Identify the incorrect statement from the following . **[NEET-2022]**

(1) All the five 5d orbitals are different in size when compared to the respective 4d orbitals.

(2) All the five 4d orbitals have shapes similar to the respective 3d orbitals.

(3) In an atom all the five 3d orbital are equal in energy in free state.

(4) The shapes of d_{xy}, d_{yz} and d_z orbital similar to each other ; and $d_x{}^2 - {}_y{}^2$ and $d_z{}^2$ are similar to each other.

Q.39 The relation between nm, (nm = the number of permissible values of magnetic quantum number (m)) for a given value of azimuthal quantum number (l), is **[NEET-2023]**

(1) $l = 2n_m + 1$

(2) $n_m = 2l^2 + 1$

(3) $n_m = l + 2$

(4) $l = \dfrac{n_m - 1}{2}$

Q.40 Select the correct statements from the following

A. Atoms of all elements are composed of two fundamental particles.

B. The mass of the electron is 9.10939 × 10^{-31} kg.

C. All the isotopes of a given element show same chemical properties:

D. Protons and electrons are collectively known as nucleons.

E. Dalton's atomic theory, regarded the atom as an ultimate particles of matter.

Choose the correct answer from the options given below **[NEET-2023]**

(1) C, D and E only   (2) A and E only

(3) B, C and E only   (4) A, B and C only

ANSWER KEY

NEET-FLASHBACK

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	1	3	2	4	4	1	1	1	1	4	2	3	3	1
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	2	3	4	4	1	3	4	1	3	2	3	2	3	1
Que.	31	32	33	34	35	36	37	38	39	40					
Ans.	3	4	4	4	1	1	1	4	4	3					