

TOPIC : ATOMIC STRUCTURE

1. The number of orbitals in the fourth energy level is
(a) 4 (b) 16
(c) 32 (d) 9
2. Which of the following sets of the quantum numbers is permitted ?
(a) $n = 4, l = 2, m = +3, s = +\frac{1}{2}$
(b) $n = 3, l = 3, m = +3, s = +\frac{1}{2}$
(c) $n = 4, l = 0, m = 0, s = +\frac{1}{2}$
(d) $n = 4, l = 3, m = +1, s = 0$.
3. A subshell with $n = 6, l = 2$ can accommodate a maximum of
(a) 12 electrons (b) 36 electrons
(c) 10 electrons (d) 72 electrons
4. According to Aufbau principle, the 19th electrons in an atom goes into the
(a) 4s-orbital (b) 3d-orbital
(c) 4p-orbital (d) 3p-orbital
5. In hydrogen atom the energy of an electron is determined by quantum number/s
(a) n only (b) n and l
(c) n, l and m (d) n, l, m and s
6. Method to determine atomic numbers was devised by
(a) J.J. Thomson (b) H.G.J. Moseley
(c) R. Milikan (d) Rutherford.
7. The electronic configuration of Mn can be written as
(a) $[\text{Ar}] 4s^2$ (b) $[\text{Ar}] 3d^6 4s^2 s$
(c) $[\text{Ar}] 3d^5 4s^1$ (d) $[\text{Ar}] 3d^5 4s^2$
8. Which of the d-orbitals lie/s in the xy-plane ?
(a) d_{xz} only (2) d_{xy} only
(3) $d_{x^2-y^2}$ only (4) d_{xy} and $d_{x^2-y^2}$
9. Which of the following species has more number of protons than the number of electrons ?
(a) F^- (b) Na^+
(c) O^{2-} (d) Ne
10. The orbital diagram in which the Aufbau principle is violated is
(a) $\begin{array}{cc} 2s & 2p \\ \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{} \end{array}$ (b) $\begin{array}{cc} 2s & 2p \\ \boxed{\uparrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow} \end{array}$
(c) $\begin{array}{cc} 2s & 2p \\ \boxed{\uparrow\downarrow} & \boxed{\uparrow} \boxed{\uparrow} \boxed{\uparrow} \end{array}$ (d) $\begin{array}{cc} 2s & 2p \\ \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \end{array}$
11. Wave character of electrons was experimentally verified by
(a) Einstein (b) de Broglie
(c) Max Planck (d) Davisson and Germer
12. The maximum value of l for an electron in fifth energy level is
(a) 5 (b) 4
(c) 3 (d) 2
13. The quantum number not obtained from the Schrodinger wave equation is
(a) n (b) l
(c) m_l (d) m_s
14. Splitting of spectral lines under the influence of magnetic field is called
(a) Stark effect
(b) Zeeman effect
(c) Photoelectric effect
(d) None of these
15. Radial part of the wave function depends on quantum numbers
(a) n and s (b) l and m
(c) l and s (d) n and l
16. Which of the following metals is most likely to exhibit photoelectric effect ?
(a) Gold (b) Platinum
(c) Chromium (d) Caesium
17. An element, M has an atomic mass 19 and atomic number 9, its ion is represented by
(a) M^+ (b) M^{2+}
(c) M^- (d) M^{2-}

18. The kinetic energy of the electron in n th orbit of hydrogen atom is given by the relation
 (a) $k^2 \frac{4\pi^2 me^4}{n^2 h^2}$ (b) $-k^2 \frac{2\pi^2 me^4}{n^2 h^2}$
 (c) $k^2 \frac{2\pi^2 me^4}{n^2 h^2}$ (d) None of these
19. According to Sommerfeld model, only circular orbit is possible for the electron in
 (a) K-shell (b) L-shell
 (c) M-shell (d) N-shell
20. The energy of a photon of radiation having wavelength 3000 \AA is nearly
 (a) $6.63 \times 10^{-19} \text{ J}$ (b) $6.63 \times 10^{-18} \text{ J}$
 (c) $6.63 \times 10^{-16} \text{ J}$ (d) $6.63 \times 10^{-49} \text{ J}$
21. The wavelength of the radio-waves having frequency 3 MHz would be
 (a) 100 m (b) 300 m
 (c) 100 nm (d) 300 nm
22. A body of mass 10 mg is moving with a velocity of 100 ms^{-1} . The wavelength of de Broglie wave associated with it would be
 (a) $6.63 \times 10^{-37} \text{ m}$ (b) $6.63 \times 10^{-31} \text{ m}$
 (c) $6.63 \times 10^{-34} \text{ m}$ (d) $6.63 \times 10^{-35} \text{ m}$
23. Which of the following has the maximum number of unpaired d-electrons ?
 (a) Zn (b) Fe^{3+}
 (c) Ni^{3+} (d) Cu^+
24. Which of the following sub-shells is not permitted ?
 (a) $4f$ (b) $4d$
 (c) $3s$ (d) $4g$
25. The minimum value of n for which g-subshell is possible is
 (a) 6 (b) 5
 (c) 4 (d) 3
26. The ground state configuration of Fe^{3+} ion in gaseous state is : (At. No. of Fe = 26)
 (a) $[\text{Ar}]^{18} 3d^3 4s^2$ (b) $[\text{Ar}]^{18} 3d^6 4s^2$
 (c) $[\text{Ar}]^{18} 3d^5$ (d) $[\text{Ar}]^{18} 3d^6$
27. The orbital angular momentum of an electron in $2s$ orbital is
 (a) $+\frac{1}{2} \frac{h}{2\pi}$ (b) Zero
 (c) $\frac{h}{2\pi}$ (d) $\sqrt{2} \frac{h}{2\pi}$
28. In Mn^{2+} ion, the number of unpaired momentum is
 (a) 2 (b) 3
 (c) 4 (d) 5
29. Which of the following ions has the maximum value of magnetic moment ?
 (a) Cu^+ (b) Cu^{2+}
 (c) Fe^{2+} (d) Fe^{3+}
30. Assuming the velocity to be the same, the wavelength of the waves associated with which of the following particles would be maximum ?
 (a) An electron (b) A proton
 (c) An α -particle (d) A deuteron
31. The number of spherical nodes in $3p$ subshell is
 (a) Three (b) Two
 (c) One (d) Zero
32. Which of the following relations is not correct ?
 (a) $\text{K.E.} = h(\nu - \nu^0)$ (b) $E = \frac{hc}{\lambda}$
 (c) $\Delta x \times \Delta p \leq \frac{h}{4\pi}$ (d) $\lambda = \frac{h}{mv}$
33. The energy of hydrogen atom in its ground state is -13.6 eV . The energy of the level corresponding in the quantum number $n = 5$ is
 (a) -0.54 eV (b) -5.40 eV
 (c) -0.85 eV (d) -2.72 eV
34. The ratio of the radii of first orbits of H, He^+ and Li^{2+} is
 (a) $1 : 2 : 3$ (b) $6 : 3 : 2$
 (c) $1 : 4 : 9$ (d) $9 : 4 : 1$
35. The frequency of a wave is $6 \times 10^{15} \text{ s}^{-1}$. Its wave number would be
 (a) 10^5 cm^{-1} (b) $2 \times 10^{-5} \text{ cm}^{-1}$
 (c) $2 \times 10^{-7} \text{ cm}$ (d) $2 \times 10^5 \text{ cm}^{-1}$

36. If the speed of electron in the Bohr's first orbit of hydrogen atom be x , then the speed of the electron in the third Bohr orbit is
 (a) $x/9$ (b) $x/3$
 (c) $3x$ (d) $9x$
37. The maximum kinetic energy of photoelectric ejected from a metal, when it is irradiated with radiation of frequency $3 \times 10^{15} \text{ s}^{-1}$ is $6.63 \times 10^{-19} \text{ J}$. The threshold frequency of the metal is
 (a) $1 \times 10^{15} \text{ s}^{-1}$ (b) $2 \times 10^{15} \text{ s}^{-1}$
 (c) $3 \times 10^{15} \text{ s}^{-1}$ (d) $1 \times 10^{-15} \text{ s}^{-1}$
38. The ionization energy of hydrogen atom is 13.6 eV. The third ionization energy of lithium would be
 (a) 13.6 eV (b) 27.2 eV
 (c) 40.8 eV (d) 122.4 eV
39. Which of the following triads represents isotones ?
 (a) ${}^{12}_6\text{C}$, ${}^{13}_6\text{C}$, ${}^{14}_6\text{C}$ (b) ${}^{40}_{18}\text{Ar}$, ${}^{42}_{20}\text{Ca}$, ${}^{43}_{21}\text{Sc}$
 (c) ${}^{20}_{18}\text{Ar}$, ${}^{40}_{20}\text{Ca}$, ${}^{41}_{21}\text{Sc}$ (d) ${}^{14}_7\text{N}$, ${}^{16}_8\text{O}$, ${}^{18}_9\text{F}$
40. If threshold wavelength (λ^0) for ejection of electron from metal is 330 nm, then work function for the photoelectric emission is
 (a) $6 \times 10^{-19} \text{ J}$ (b) $1.2 \times 10^{-18} \text{ J}$
 (c) $3 \times 10^{-19} \text{ J}$ (d) $6 \times 10^{-12} \text{ J}$
41. The uncertainty in the position of an electron moving with a velocity of $1.0 \times 10^4 \text{ cm s}^{-1}$ (accurate up to 0.011 %) will be
 (a) 1.92 cm (b) 7.68 cm
 (c) 0.528 cm (d) 3.8 cm
42. The first emission line in the atomic spectrum of hydrogen in the Balmer series appears at
 (a) $\frac{5R}{36} \text{ cm}^{-1}$ (b) $\frac{3R}{4} \text{ cm}^{-1}$
 (c) $\frac{7R}{114} \text{ cm}^{-1}$ (d) $\frac{9R}{400} \text{ cm}^{-1}$
43. If kinetic energy of a proton is increased nine times the wavelength of the de-Broglie wave associated with it would become
 (a) 3 times (b) 9 times
 (c) $\frac{1}{3}$ times (d) $\frac{1}{9}$ times
44. The two particles A and B have de Broglie wavelength 1 nm and 5 nm respectively. If mass of A is four times the mass of B, the ratio of kinetic energies of A and B would be
 (a) 5 : 1 (b) 25 : 4
 (c) 20 : 1 (d) 5 : 4
45. The wavelength of a moving body of mass 0.1 mg is $3.31 \times 10^{-29} \text{ m}$. The kinetic energy of the body would be
 (a) $2 \times 10^{-6} \text{ J}$ (b) $1 \times 10^{-3} \text{ J}$
 (c) $4 \times 10^{-3} \text{ J}$ (d) $2 \times 10^{-3} \text{ J}$

ANSWERS KEY

1	B	11	D	21	A	31	C	41	C
2	C	12	B	22	B	32	C	42	A
3	C	13	D	23	B	33	A	43	C
4	A	14	B	24	D	34	B	44	B
5	A	15	D	25	B	35	D	45	D
6	B	16	D	26	C	36	B		
7	D	17	C	27	B	37	B		
8	D	18	C	28	D	38	D		
9	B	19	A	29	B	39	B		
10	B	20	A	30	A	40	A		