ATOMIC STRUCTURE

Single Correct Answer Type

1. The energy of electron is maximum at
(A) Nucleus (B) Ground state
(C) First excited state (D) Infinite distance from the nucleus

2. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon:
(A) 3s (B) 2p (C) 2s (D) 1s

3. Which quantum number is not related with Schrodinger equation
(A) Principal (B) Azimuthal (C) Magnetic (D) Spin

4. The shortest wavelength of He atom in Balmer series is x, then longest wavelength in the Paschene series of Li^{+2} is :
(A) $\frac{36x}{5}$ (B) $\frac{16x}{5}$ (C) $\frac{9x}{5}$ (D) $\frac{5x}{9}$

5. An electron, a proton and an alpha particle have kinetic energies of 16E, 4E and E respectively. What is the qualitative order of their de-Broglie wavelengths?
(A) $\lambda_e > \lambda_p = \lambda_\alpha$ (B) $\lambda_p = \lambda_\alpha > \lambda_e$ (C) $\lambda_p > \lambda_e > \lambda_\alpha$ (D) $\lambda_\alpha < \lambda_e >> \lambda_p$

6. The energy of an electron in the first Bohr orbit of hydrogen atom is –13.6 eV. The possible energy value of the excited state per electron in Bohr orbit of hydrogen is
(A) –3.4 eV (B) –4.2 eV (C) + 6.8 eV (D) –6.8 eV

7. If radius of second stationary orbit (in Bohr's atom) is R. Then radius of third orbit will be :
(A) R/3 (B) 9R (C) R/9 (D) 2.25R

8. The ratio of wave length of photon corresponding to the α-line of lyman series in H atom and β-line of Baimer series in He^+ is ;
(A) 1 : 1 (B) 1 : 2 (C) 1 : 4 (D) 3 : 16

9. Three energy levels P, Q, R of a certain atom are such that $E_P < E_Q < E_R$. If λ_1, λ_2 and λ_3, are the wave length of radiation corresponding to transition $R \to Q : Q \to P$ and $R \to P$ respectively. The correct relationship between λ_1, λ_2 and λ_3 is
(A) $\lambda_1 + \lambda_2 = \lambda_3$ (B) $\frac{1}{\lambda_3} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$ (C) $\lambda_3 = \sqrt{\lambda_1 \lambda_2}$ (D) $\frac{2}{\lambda_3} = \frac{1}{\lambda_1} + \frac{1}{\lambda_2}$

10. The value of $(n_2 + n_1)$ and $(n_2^2 - n_1^2)$ for He^+ ion in atomic spectrum are 4 and 8 respectively. The wavelength of emitted photon when electron jump from n_2 to n_1 is
(A) $\frac{32}{9}R_H$ (B) $\frac{9}{32}R_H$ (C) $\frac{9}{32R_H}$ (D) $\frac{32}{9R_H}$

11. Number of possible spectral lines which may be emitted in bracket series in H atom if electrons present 9^{th} excited level returns to ground level, are
(A) 21 (B) 6 (C) 45 (D) 5

12. The longest wavelength of He^+ in Paschen series is "m", then shortest wavelength of Be^{3+} in Paschen series is (in terms of m)

(A) $\frac{5}{36}m$ (B) $\frac{64}{7}m$ (C) $\frac{53}{8}m$ (D) $\frac{7}{64}m$

13. Consider the following nuclear reactions involving X & Y.

$X \longrightarrow Y + {}_2He^4$ $\quad$ $Y \longrightarrow {}_8O^{18} + {}_1H^1$

If both neutrons as swell as protons in both the sides are conserved in nuclear reaction then moles of neutrons in 4.6 gm of X

(A) $2.4N_A$ (B) 2.4 (C) 4.6 (D) $0.2N_A$

14. Electromagnetic radiations having $\lambda = 310Å$ are subjected to a metal sheet having work function = 12.8 eV. What will be the velocity of photoelectrons with maximum kinetic energy

(A) 0, no emission will occur (B) 2.18×10^6 m / s

(C) $2.18\sqrt{2} \times 10^6$ m / s (D) 8.72×10^6 m / s

15. Assuming Heisenberg uncertainity Principle to be true what could be the minimum uncertainity in de-Broglie wavelength of a moving electron accelerated by potential difference of 6V whose uncertainity in position is $\frac{7}{22}$ n.m .

(A) 6.25Å (B) 6Å (C) 0.625Å (D) 0.3125Å

16. The number of nodal planes in a p_x orbital is

(A) one (B) two (C) three (D) zero

17. The radius of which of the following orbit is same as that of the first Bohr's orbit of hydrogen atom?

(A) $He^+ (n = 2)$ (B) $Li^{2+} (n = 2)$ (C) $Li^{2+} (n = 3)$ (D) $Be^{3+} (n = 2)$

18. Assuming that Hund's rule is violated, the bond order and magnetic nature of the diatomic molecular B_2 is

(A) 1 and diamagnetic (B) 0 and diamagnetic

(C) 1 and paramagnetic (D) 0 and paramagnetic

19. The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is [a_0 is Bohr radius]

(A) $\frac{h^2}{4\pi^2 m a_0^2}$ (B) $\frac{h^2}{16\pi^2 m a_0^2}$ (C) $\frac{h^2}{32\pi^2 m a_0^2}$ (D) $\frac{h^2}{64\pi^2 m a_0^2}$

20. The work function (ϕ) of some metals is listed below. The number of metals which will show photoelectric effect when light of 300 nm wavelength falls on the metal is

Metal	Li	Na	K	Mg	Cu	Ag	Fe	Pt	W
ϕ (eV)	2.4	2.3	2.2	3.7	4.8	4.3	4.7	6.3	4.75

(A) 4 (B) 2 (C) 1 (D) 8

Numerical based

21. The KE of an electron emitted from tungsten surface is 3.06 eV. What voltage would be required to bring the electron to rest.

22. An electron has a speed of 40 m/s, accurate upto 99.99%. What is the uncertainity in the locating in the position

23. Find the difference in the value of $(n+\ell)$ for 19th electron of Cr and 21st electron Sc.

24. Radiation of λ = 155 nm was irradiated on Li (work function = 5eV) plate. The stopping potential (in eV) is _____

25. The maximum number of electrons that can have principal quantum number, n = 3, and spin quantum number, $m_s = -\frac{1}{2}$, is:

KEY

1.	D	**2.**	D	**3.**	D	**4.**	B	**5.**	A
6.	A	**7.**	D	**8.**	A	**9.**	B	**10.**	C
11.	B	**12.**	D	**13.**	B	**14.**	C	**15.**	C
16.	A	**17.**	D	**18.**	A	**19.**	C	**20.**	A
21.	3.06	**22.**	0.0144	**23.**	1	**24.**	3	**25.**	9

❊ *Wish You all the Best* ❊