QUESTIONS FROM COMPETITIVE EXAMS

9.1 Thomson's Atom Model
9.2 Geiger - Marsden Experiment

(MHT-CET 2001)

1. The radius of hydrogen atom, in its ground state, is of the order of

a) 10^{-8} cm b) 10^{-6} cm c) 10^{-5} cm d) 10^{-4} cm

(MHT-CET 2005)

2. The α-particle scattering experiment suggests that

a) positive charge and negative charge are present inside the atom in packets

b) positive charge revolves around individual negative charge

c) positive charges are present in a dense core and the negative charges are present in the surroundings of that core

d) individual negative charge revolves around individual positive charge

(MHT-CET 2007)

3. The current in the first orbit of Bohr's hydrogen atom is

a) 0.01 mA b) 1 mA c) 2.63 mA d) 10 mA

9.3 Rutherford's Atom Model

(MHT-CET 2001)

4. Charge on an α-particle is

a) 1.6×10^{-19} C b) 3.2×10^{-19} C

c) 1.6×10^{-20} C d) 4.8×10^{-19} C

(MHT-CET 2003)

5. According to Rutherford, electrons revolve in a circular orbit around the nucleus in order to

a) attract protons b) absorb energy

c) radiate energy d) nullify attraction from nucleus

(MHT-CET 2007)

6. Radius of nth Bohr's orbit is directly proportional to

a) n b) $\sqrt{n}$ c) n^{-1} d) n^2

(MHT-CET 2012)

7. In Bohr's orbit, angular momentum of an electron is proportional to

a) $\sqrt{r}$ b) $\sqrt{r^3}$ c) r d) $r^{-1/2}$

(MH-CET 2016)

8. When an electron in Hydrogen atom revolves in stationary orbit, it

a) does not radiate light though its velocity changes

b) does not radiate light and velocity remains unchanged

c) radiates light but its velocity is unchanged

d) radiates light with the change of energy

(MHT-CET 2021)

9. As per Bohr's model of an hydrogen atom, the angular momentum for an electron in the third orbit will be

a) $\frac{h}{2\pi}$ b) $\frac{3h}{2\pi}$ c) $\frac{3h}{\pi}$ d) $\frac{5h}{2\pi}$

9.4 Bohr's Atom Model

(MHT-CET 2002)

10. Ratio of velocity in first orbit of H_2 to speed of light is

a) $2e^2/\epsilon_0 hn^2c$ b) $2e^2/\epsilon_0 hc$ c) $e^2/\epsilon_0 hc$ d) $e^2/2\epsilon_0 hc$

(MHT-CET 2004)

11. The electron in the first orbit of hydrogen has velocity 2.18×10^6 m/s. If radius of first orbit is 0.53 Å then orbital current in the orbit is

a) 0.41 mA b) 1.04 mA c) 1.84 mA d) 2.4 mA

12. In Bohr atom, the angular velocity of electron is

a) inversely proportional to n^2 b) inversely proportional to n^3
c) directly proportional to n d) independent of n

(MHT-CET 2006)

13. A ground state hydrogen atom has an energy of –13.6 eV. If the electron is excited to the energy state n = 3, its energy becomes

a) – 12.09 eV b) – 13.6 eV c) – 4.5 eV d) – 1.51 eV

14. Which of the following transitions gives the highest frequency for electron emission ?

a) $n_1 = 1$ to $n_2 = 2$ b) $n_1 = 2$ to $n_2 = 1$ c) $n_1 = 2$ to $n_2 = 5$ d) $n_1 = 5$ to $n_2 = 2$

(MHT-CET 2007)

15. The magnitude of the P.E. of the electron in the first orbit of the Bohr's atom is E. Its K.E. is

a) E b) 2 E c) E/2 d) E/4

(MHT-CET 2008)

16. What is the ratio of orbital magnetic moment and angular momentum of an electron in Bohr's atom ?

a) e / 2m b) e / m c) 2e / m d) m / 2e

17. If F is the force between two electrons placed at a distance of 1 m, then Rydberg's constant is

a) $\frac{m\pi F}{h^3c}$ b) $\frac{2m\pi^2 F}{h^3c}$ c) $\frac{2m\pi^2 F^2}{h^3c}$ d) $\frac{m\pi F^2}{h^3c}$

18. If the velocity of an electron in its first orbit of hydrogen atom is 2.1×10^6 m/s, then its velocity in the third orbit is

a) 7×10^6 m/s b) 7×10^5 m/s c) 7×10^4 m/s d) 2×10^4 m/s

(MHT-CET 2009)

19. If an electron is revolving around the hydrogen nucleus at a distance 0.1 mm. What should be its speed ?

a) 2.188×10^6 m/s b) 1.094×10^6 m/s c) 4.376×10^6 m/s d) 1.59×10^6 m/s

20. In a hydrogen atom, the electron is making 6.6×10^{15} rps around the nucleus in an orbit of radius 0.528 Å. The magnetic moment will be

a) 1×10^{-15} Am^2 b) 1×10^{-10} Am^2 c) 1×10^{-23} Am^2 b) 1×10^{-27} Am^2

21. If the radius of hydrogen atom in its ground state is 5.3×10^{-11} m. After collision with an electron it is found to have a radius of 21.2×10^{-11} m. The principal quantum number of the final orbit is

a) n = 4 b) n = 3 c) n = 2 d) n = 16

(MHT-CET 2010)

22. The orbital frequency of an electron in the hydrogen atom is proportional to

a) n^3 b) n^{-3} c) n d) n^0

(MHT-CET 2011)

23. The acceleration of electron in Bohr's 1st orbit is given by

a) $\frac{h}{4\pi m^2 r^3}$ b) $\frac{h}{4\pi m^2 r}$ c) $\frac{h^2}{4\pi m^2 r^3}$ d) $\frac{h}{4\pi mr}$

24. An electron moves in Bohr's orbit. The magnetic field at the centre is proportional to

a) n^{-5} b) n^{-3} c) n^{-4} d) n^{-2}

(MHT-CET 2012)

25. In Bohr's orbit, kinetic energy of an electron in the nth orbit of an atom in terms of angular momentum is

a) 1/L b) $1/L^2$ c) L^2 d) $1/L^3$

(MH-CET 2015)

26. For the hydrogen atom, the energy of radiation emitted in the transition from 4th excited state to 2nd excited state, according to Bohr's theory is

a) 0.567 eV b) 0.667 eV c) 0.967 eV d) 1.267 eV

(MH-CET 2016)

27. In Bohr's theory of Hydrogen atom, the electron jumps from higher orbit 'n' to lower orbit 'p'. The wavelength will be minimum for the transition

a) n = 5 to p =4 b) n = 4 to p =3 c) n = 3 to p =2 d) n = 2 to p =1

(MH-CET 2017)

28. An electron in hydrogen atom jumps from second Bohr orbit to ground state and difference between energies of the two states is radiated in the form of photons. If the work function of the material is 4.2 eV then stopping potential is (energy of electron in

nth orbit = $\frac{13.6}{n^2}$ eV)

a) 2 eV b) 4 eV c) 6 eV d) 8 eV

(MHT-CET 2019)

29. Bohr model is applied to a particle of mass 'm' and charge 'q' moving in a plane under the influence of a transverse magnetic field 'B'. The energy of the charged particle in the nth level will be

a) nhqB / πm b) nhqB / 2 πm c) nhqB / 4 πm d) 2 nhqB / πm

30. In hydrogen emission spectrum, for any series, the principal quantum number is 'n'. Corresponding maximum wavelength 'λ' is

a) $\frac{R(2n+1)}{n^2(n+1)}$ b) $\frac{R(2n+1)}{n^2(n+1)^2}$

c) $\frac{n^2(n+1)}{R(2n+1)}$ d) $\frac{n^2(n+1)^2}{R(2n+1)}$

(MHT-CET 2004)

40. Balmer series is obtained in
a) visible region
b) ultraviolet region
c) infrared region
d) visible as well as ultraviolet region

41. $\lambda_\alpha / \lambda_\beta$ in Balmer series is
a) 27 : 20
b) 20 : 27
c) 5 : 36
d) 12 : 64

42. The least energetic wave number in the Paschen series is
a) 5R/16
b) R/4
c) R/9
d) 7R/144

(MHT-CET 2005)

43. Wavelength of first line in Lymen series is λ. What is wavelength of first line in Balmer series ?
a) $\frac{5\lambda}{27}$
b) $\frac{27\lambda}{5}$
c) $\frac{36\lambda}{5}$
d) $\frac{5\lambda}{36}$

44. Maximum energy is evolved during which of the following transitions ?
a) n = 1 to n = 2
b) n = 2 to n = 1
c) n = 2 to n = 6
d) n = 6 to n = 2

Lower the value of lower quantum number to which electron is jumping, higher will be the frequency i.e., higher will be the energy. Therefore n = 2 to n = 1 transition produces highest energy.

(MHT-CET 2009)

45. The spectral series of the hydrogen atom that lies in the visible region of the electromagnetic spectrum.
a) Paschen
b) Balmer
c) Lyman
d) Bracket.

46. If the electron in a hydrogen atom jumps from an orbit with level $n_1 = 2$ to an orbit with level $n_2 = 1$. The emitted radiation has a wavelength given by
a) $\lambda = \frac{5}{3R}$
b) $\lambda = \frac{4}{3R}$
c) $\lambda = \frac{R}{4}$
d) $\lambda = \frac{3R}{4}$

(MHT-CET 2010)

47. Balmer series of hydrogen atom lies in
a) microwave region
b) visible region
c) ultraviolet region
d) infrared region

(MHT-CET 2014)

48. If an electron in hydrogen atom jumps from an orbit of level n = 3 to an orbit of level n = 2, emitted radiation has a frequency (R = Rydberg's constant, c = velocity of light)
a) $\frac{3Rc}{27}$
b) $\frac{Rc}{25}$
c) $\frac{8\,Rc}{9}$
d) $\frac{5\,Rc}{36}$

(MH-CET 2015)

49. For Balmer series, wavelength of first line is 'λ_1' and for Brackett series, wavelength of first line is 'λ_2', then $\frac{\lambda_1}{\lambda_2}$ is
a) 0.081
b) 0.162
c) 0.198
d) 0.238