Atomic models and Planck's quantum theory

22. When β -particles are sent through a tin metal foil, most of them go straight through the foil as

(a) β -particles are much heavier than electrons

(b) β -particles are positively charged

(c) Most part of the atom is empty space

(d) β -particles move with high velocity

23. The energy of second Bohr orbit of the hydrogen atom is –328 $kJ\ mol^{-1}$, hence the energy of fourth Bohr orbit would be

(a) – 41 $kJ\ mol^{-1}$

(b) –1312 $kJ\ mol^{-1}$

(c) –164 $kJ\ mol^{-1}$

(d) – 82 $kJ\ mol^{-1}$

24. When an electron revolves in a stationary orbit then

(a) It absorbs energy

(b) It gains kinetic energy

(c) It emits radiation

(d) Its energy remains constant

25. A moving particle may have wave motion, if

(a) Its mass is very high

(b) Its velocity is negligible

(c) Its mass is negligible

(d) Its mass is very high and velocity is negligible

26. The postulate of Bohr theory that electrons jump from one orbit to the other, rather than flow is according to

(a) The quantisation concept

(b) The wave nature of electron

(c) The probability expression for electron

(d) Heisenberg uncertainty principle

27. The frequency of an electromagnetic radiation is $2 \times 10^6 Hz$. What is its wavelength in metres

(Velocity of light $= 3 \times 10^8 ms^{-1}$)

(a) 6.0×10^{14} (b) 1.5×10^4

(c) 1.5×10^2 (d) 0.66×10^{-2}

28. What is the packet of energy called

(a) Electron (b) Photon

(c) Positron (d) Proton

29. The energy of an electron in n^{th} orbit of hydrogen atom is

(a) $\frac{13.6}{n^4} eV$ (b) $\frac{13.6}{n^3} eV$

(c) $\frac{13.6}{n^2} eV$ (d) $\frac{13.6}{n} eV$

30. If wavelength of photon is $X^{3-}h = 6.6 \times 10^{-34}$ *J-sec,* then momentum of photon is

(a) $3 \times 10^{-23} kgms^{-1}$

(b) $3.33 \times 10^{22} kgms^{-1}$

(c) $1.452 \times 10^{-44} kgms^{-1}$

(d) $6.89 \times 10^{43} kgms^{-1}$

31. The expression for Bohr's radius of an atom is

(a) $r = \frac{n^2h^2}{4\pi^2me^4z^2}$

(b) $r = \frac{n^2h^2}{4\pi^2me^2z}$

(c) $r = \frac{n^2h^2}{4\pi^2me^2z^2}$

(d) $r = \frac{n^2h^2}{4\pi^2m^2e^2z^2}$

32. The energy of an electron revolving in n^{th} Bohr's orbit of an atom is given by the expression

(a) $E_n = -\frac{2\pi^2m^4e^2z^2}{n^2h^2}$

(b) $E_n = -\frac{2\pi^2me^2z^2}{n^2h^2}$

(c) $E_n = -\frac{2\pi^2me^4z^2}{n^2h^2}$

(d) $E_n = -\frac{2\pi m^2e^2z^4}{n^2h^2}$

33. Who modified Bohr's theory by introducing elliptical orbits for electron path

(a) Hund

(b) Thomson

(c) Rutherford

(d) Sommerfield

34. Bohr's radius can have

(a) Discrete values

(b) $+ve$values

(c) $-ve$values

(d) Fractional values

35. The first use of quantum theory to explain the structure of atom was made by

(a) Heisenberg (b) Bohr

(c) Planck (d) Einstein

36. An electronic transition from 1s orbital of an atom causes

(a) Absorption of energy

(b) Release of energy

(c) Both release or absorption of energy

(d) Unpredictable

37. In an element going away from nucleus, the energy of particle

(a) Decreases

(b) Not changing

(c) Increases

(d) None of these

38. The α -particle scattering experiment of Rutherford concluded that

(a) The nucleus is made up of protons and neutrons
(b) The number of electrons is exactly equal to number of protons in atom
(c) The positive charge of the atom is concentrated in a very small space
(d) Electrons occupy discrete energy levels

39. Wavelength associated with electron motion
(a) Increases with increase in speed of electron
(b) Remains same irrespective of speed of electron
(c) Decreases with increase in speed of e^-
(d) Is zero

40. The element used by Rutherford in his famous scattering experiment was
(a) Gold (b) Tin
(c) Silver (d) Lead

41. If electron falls from $n = 3$ to $n = 2$, then emitted energy is
(a) $10.2 eV$ (b) $12.09 eV$
(c) $1.9 eV$ (d) $0.65 eV$

42. The radius of the nucleus is related to the mass number A by
(a) $R = R_o A^{1/2}$ (b) $R = R_o A$
(c) $R = R_o A^2$ (d) $R = R_o A^{1/3}$