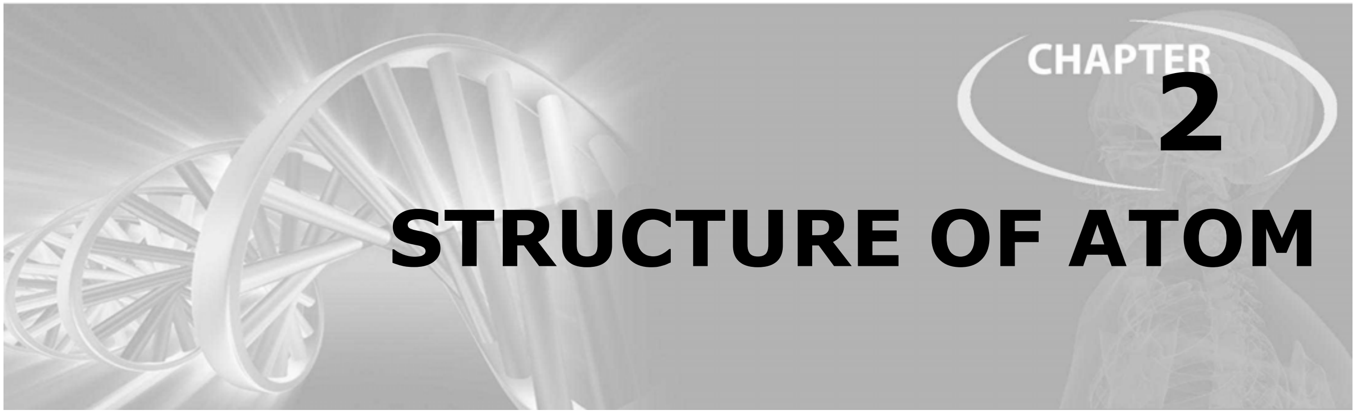


CHAPTER 2

STRUCTURE OF ATOM

FACT/DEFINITION TYPE QUESTIONS

1. Which of the scientist were able to prove that atom is no longer non-divisible?
(a) Dalton (b) Michael Faraday
(c) Thomson (d) Chadwick

2. Which of the following is never true for cathode rays ?
(a) They possess kinetic energy.
(b) They are electromagnetic waves.
(c) They produce heat.
(d) They produce mechanical pressure.

3. Cathode rays are deflected by
(a) an electric field only (b) magnetic field only
(c) by both (d) by none

4. Which of the following statement is not correct about the characteristics of cathode rays?
(a) They start from the cathode and move towards the anode.
(b) They travel in straight line in the absence of an external electrical or magnetic field.
(c) Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.
(d) Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.

5. Which of the following statements about the electron is incorrect?
(a) It is negatively charged particle
(b) The mass of electron is equal to the mass of neutron.
(c) It is a basic constituent of all atoms.
(d) It is a constituent of cathode rays.

6. While performing cathode ray experiments, it was observed that there was no passage of electric current under normal conditions. Which of the following can account for this observation ?
(a) Dust particles are present in air
(b) Carbon dioxide is present in air
(c) Air is a poor conductor of electricity under normal conditions
(d) None of the above

7. Which is not true with respect to cathode rays?
(a) A stream of electrons
(b) Charged particles
(c) Move with speed same as that of light
(d) Can be deflected by magnetic fields

8. What is the optimum conditions required to study the conduction of electricity through gases.
(a) High pressure and low voltage
(b) High pressure and high voltage
(c) Low pressure and high voltage
(d) Low pressure and low voltage

9. In discharge tube experiment stream of negatively charged particles travel from
(a) anode to cathode (b) cathode to anode
(c) Both (a) and (b) (d) Electrons does not travel

10. Millikan performed an experiment method to determine which of the following ?
(a) Mass of the electron (b) Charge of the electron
(c) e/m ratio of electron (d) Both (a) and (b)

11. The discovery of neutron became very late because :
(a) neutrons are present in nucleus
(b) neutrons are chargeless
(c) neutrons are fundamental particles
(d) all of the above

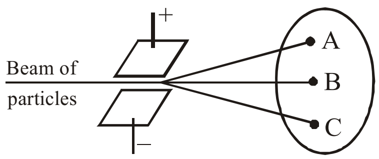
12. Which is correct statement about proton ?
(a) Proton is nucleus of deuterium
(b) Proton is α-particle
(c) Proton is ionized hydrogen molecule
(d) Proton is ionized hydrogen atom

13. The lightest particle is :
(a) α -particle (b) positron
(c) proton (d) neutron

14. When beryllium is bombarded with alpha particles (Chadwick's experiment) extremely penetrating radiations, which cannot be deflected by electrical or magnetic field are given out. These are :
(a) A beam of protons
(b) Alpha rays
(c) A beam of neutrons
(d) A beam of neutrons and protons

15. Neutron is discovered by
(a) Chadwick (b) Rutherford
(c) Yukawa (d) Dalton

16. Suppose beam containing all three fundamental subatomic particles are allowed to pass through an electric field as shown in figure. The subatomic particles detected at three points A, B and C on the screen respectively are ?



(a) Protons, neutrons, electrons
(b) Electrons, neutrons, protons
(c) Electrons, protons, neutrons
(d) Neutrons, protons, electrons

17. Which of the following properties of atom could be explained correctly by Thomson Model of atom?
(a) Overall neutrality of atom.
(b) Spectra of hydrogen atom.
(c) Position of electrons, protons and neutrons in atom.
(d) Stability of atom.

18. Arrange the following in terms of penetrating power.
α-rays, β-rays, γ-rays
(a) $\alpha > \beta > \gamma$ (b) $\alpha < \beta < \gamma$
(c) $\alpha > \beta < \gamma$ (b) $\alpha > \gamma > \beta$

19. Which of the rays are not deflected by the electric and magnetic field ?
(a) γ-rays (b) X-rays
(c) β-rays (d) Both (a) and (b)

20. Rutherford's experiment on the scattering of α -particles showed for the first time that the atom has :
(a) electrons (b) protons
(c) nucleus (d) neutrons'

21. When atoms are bombarded with alpha particles, only, a few in million suffer deflection, others pass out undeflected. This is because
(a) the force of repulsion on the moving alpha particle is small
(b) the force of attraction between alpha particle and oppositely charged electrons is very small
(c) there is only one nucleus and large number of electrons
(d) the nucleus occupies much smaller volume compared to the volume of the atom

22. Rutherford's α-particle dispersion experiment concludes
(a) all positive ions are deposited at small part
(b) all negative ions are deposited at small part
(c) proton moves around the electron
(d) neutrons are charged particles.

23. Rutherford's experiment which established the nuclear model of the atom used a beam of
(a) β-particles which impinged on a metal foil and got absorbed
(b) γ-rays which impinged on a metal foil and ejected electrons
(c) helium atoms, which impinged on a metal foil and got scattered
(d) helium nuclei, which impinged on a metal foil and got scattered

24. Which of the following scientists explained his model on the basis of centrifugal force ?
(a) Thomson (b) Dalton
(c) Millikan (d) Rutherford

25. The number of neutrons in dipositive zinc ion with mass number 70 is
(a) 34 (b) 36
(c) 38 (d) 40

26. The number of electrons in $\left[{}^{40}_{19}K\right]^{1-}$ is
(a) 20 (b) 40
(c) 18 (d) 19

27. Which of the following does not contain number of neutrons equal to that of ${}^{40}_{18}Ar$?
(a) ${}^{41}_{19}K$ (b) ${}^{43}_{21}Sc$
(c) ${}^{40}_{21}Sc$ (d) ${}^{42}_{20}Ca$

28. Number of protons, neutrons and electrons in the element ${}_{89}X^{231}$ is
(a) 89, 89, 242 (b) 89, 142, 89
(c) 89, 71, 89 (d) 89, 231, 89

29. An element has atomic number 11 and mass number 24. What does the nucleus contain?
(a) 11 protons, 13 neutrons
(b) 11 protons, 13 neutrons, 13 electrons
(c) 13 protons, 11 neutrons
(d) 13 protons, 11 electrons

30. The number of electrons and neutrons of an element is 18 and 20 respectively. Its mass number is
(a) 2 (b) 17
(c) 37 (d) 38

31. 'A' represents mass no. and Z represents atomic no. then α - decay is characterized by
(a) Z increases by 2, A decreases by 4
(b) Z decreases by 2, A increases by 4
(c) Z decreases by 2, A decreases by 4
(d) Z increases by 2, A increases by 4.

32. Nucleons are
(a) only neutrons
(b) neutrons + protons
(c) neutrons + protons + electrons
(d) neutrons + electrons

33. Atoms with same mass number but different atomic numbers are called
(a) isotopes (b) isobars
(c) isochores (d) None of these

34. Which of the following pairs will have same chemical properties ?

(a) ${}^{14}_{6}C$ and ${}^{15}_{7}N$ (b) O^{2-} and F^{-}
(c) ${}^{40}_{18}Ar$ and ${}^{40}_{19}K$ (d) ${}^{35}_{17}Cl$ and ${}^{37}_{17}Cl$

35. What is the difference between two species if one has atomic mass = 14 and atomic number = 7 whereas the other has atomic mass = 14 and atomic number = 6 ?

(a) Neutrons (b) Protons
(c) Electrons (d) All of these

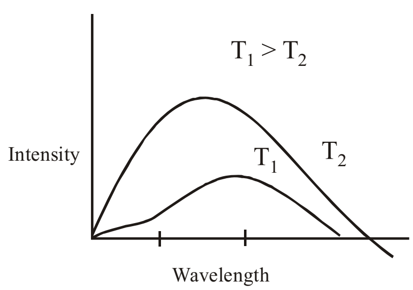
36. From the data given below A, B, C and D respectively are,

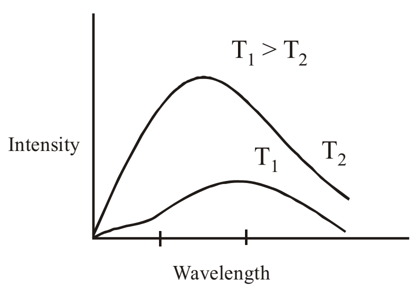
(A) 10 e^-, atomic no. 11 (B) 10 e^-, atomic no. 6
(C) 10 e^-, atomic no. 10 (D) 10 e^-, atomic no. 9
(a) Na^+, C^{4-}, Ne, F^- (b) C^{4-}, Ne, Na^-, F^-
(c) F^-, Na^+, Ne, C^{4-} (d) F^-, Na^+, C^{4-}, Ne

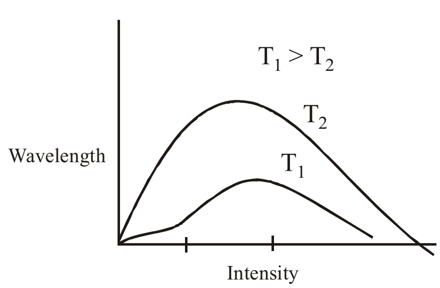
37. If the wavelength of the electromagnetic radiation is increased to thrice the digital value, then what will be the percent change in the value of frequency of the electromagnetic radiation.

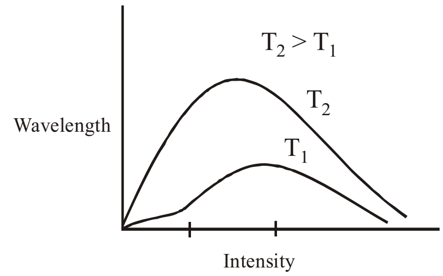
(a) Increases by 33% (b) Decreases by 33%
(c) Increases by 66% (d) Decreases by 66%

38. Which is the correct schematic representation of the graph of black body radiation.

(a)


(b)


(c)


(d)


39. The ideal body, which emits and absorbs radiations of all frequencies, is called a black body and the radiation emitted by such a body is called

(a) white body radiation (b) black body radiation
(c) black body emission (d) None of these

40. Which one of the following is not the characteristic of Planck's quantum theory of radiation ?

(a) The energy is not absorbed or emitted in whole number or multiple of quantum
(b) Radiation is associated with energy
(c) Radiation energy is not emitted or absorbed continuously but in the form of small packets called quanta
(d) This magnitude of energy associated with a quantum is proportional to the frequency.

41. Which of the following is related with both wave nature and particle nature ?

(a) Interference (b) $E = mc^2$
(c) Diffraction (d) $E = h\nu$

42. The value of Planck's constant is 6.63×10^{-34} Js. The velocity of light is 3.0×10^8 m s^{-1}. Which value is closest to the wavelength in nanometers of a quantum of light with frequency of 8×10^{15} s^{-1} ?

(a) 3×10^7 (b) 2×10^{-25}
(c) 5×10^{-18} (d) 4×10^1

43. In the photo-electron emission, the energy of the emitted electron is

(a) greater than the incident photon
(b) same as than of the incident photon
(c) smaller than the incident photon
(d) proportional to the intensity of incident photon

44. When a metal surface is exposed to solar radiations

(a) The emitted electrons have energy less than a maximum value of energy depending upon frequency of incident radiations
(b) The emitted electrons have energy less than maximum value of energy depending upon intensity of incident radiation
(c) The emitted electrons have zero energy
(d) The emitted electrons have energy equal to energy of photons of incident light

45. In photoelectric effect, at which frequency electron will be ejected with certain kinetic energy (ν_0 = threshold frequency).

(a) $\nu > \nu_0$ (b) $\nu_0 > \nu$
(c) $\nu_0 \geq \nu$ (d) $\nu \geq \nu_0$

46. In continous spectrum light of __(i)__ wavelength is deviated the __ii__

(a) (i) = longest, least (b) (ii) = shortest, least
(c) (i) = shortest, most (d) (i) = longest, most

47. Which of the following statements do not form a part of Bohr's model of hydrogen atom ?

(a) Energy of the electrons in the orbits are quantized
(b) The electron(s) in the orbit nearest to the nucleus has the lowest energy
(c) Electrons revolve in different orbits around the nucleus
(d) The position and velocity of the electrons in the orbit cannot be determined simultaneously

48. An electron from one Bohr stationary orbit can go to next higher orbit

(a) by emission of electromagnetic radiation
(b) by absorption of any electromagnetic radiation
(c) by absorption of electromagnetic radiation of particular frequency
(d) without emission or absorption of electromagnetic radiation

49. For a Bohr atom angular momentum M of the electron is ($n = 0, 1, 2, ...$) :

(a) $\frac{nh^2}{4\pi}$ (b) $\frac{n^2h^2}{4\pi}$
(c) $\frac{\sqrt{nh^2}}{4\pi}$ (d) $\frac{nh}{2\pi}$

50. According to Bohr's theory, the angular momentum of an electron in 5^{th} orbit is

(a) $10\ h/\pi$ (b) $2.5\ h/\pi$
(c) $25\ h/\pi$ (d) $1.0\ h/\pi$

51. In Bohr's model, atomic radius of the first orbit is y, the radius of the 3^{rd} orbit, is

(a) $y/3$ (b) y
(c) $3y$ (d) $9y$

52. The radius of 1^{st} Bohr's orbit for hydrogen atom is 'r'. The radius of second Bohr's orbit is

(a) 4r (b) r^3
(c) $4r^2$ (d) $r^{1/3}$

53. The third line of the Balmer series, in the emission spectrum of the hydrogen atom, is due to the transition from the

(a) fourth Bohr orbit to the first Bohr orbit
(b) fifth Bohr orbit to the second Bohr orbit
(c) sixth Bohr orbit to the third Bohr orbit
(d) seventh Bohr orbit to the third Bohr orbit

54. Which one of the following pairs is not correctly matched ?

(a) Rutherford-Proton
(b) J.J. Thomson-Electron
(c) J.H. Chadwick-Neutron
(d) Bohr-Isotopes

55. If r is the radius of the first orbit, the radius of n^{th} orbit of H-atom is given by

(a) rn^2 (b) rn
(c) r/n (d) $r^2\ n^2$

56. The radius of hydrogen atom in the ground state is 0.53 Å. The radius of Li^{2+} ion (atomic number = 3) in a similar state is

(a) 0.17 Å (b) 0.265 Å
(c) 0.53 Å (d) 1.06 Å

57. The energy of an electron in the n^{th} Bohr 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

58. 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) -82 kJ mol^{-1}
(c) -164 kJ mol^{-1} (d) -1312 kJ mol^{-1}

59. In a hydrogen atom, if energy of an electron in ground state is 13.6. eV, then that in the 2^{nd} excited state is

(a) 1.51 eV (b) 3.4 eV
(c) 6.04 eV (d) 13.6 eV.

60. The energy of an electron in second Bohr orbit of hydrogen atom is :

(a) -5.44×10^{-19}eV (b) -5.44×10^{-19}cal
(c) -5.44×10^{-19}kJ (d) -5.44×10^{-19}J

61. The energy of electron in first energy level is -21.79×10^{-12} erg per atom. The energy of electron in second energy level is :

(a) -54.47×10^{-12} erg $atom^{-1}$
(b) -5.447×10^{-12} erg $atom^{-1}$
(c) -0.5447×10^{-12} erg $atom^{-1}$
(d) -0.05447×10^{-12} erg $atom^{-1}$

62. The ionisation potential of a hydrogen atom is –13.6 eV. What will be the energy of the atom corresponding to n = 2.

(a) – 3.4 eV (b) – 6.8 eV
(c) – 1.7 eV (d) –2.7 eV

63. The line spectrum of He^+ ion will resemble that of

(a) hydrogen atom (b) Li^+ ion
(c) helium atom (d) lithium atom

64. What does negative sign in the electronic energy for hydrogen atom convey.

(a) Energy of electron when $n = \infty$
(b) The energy of electron in the atom is lower than the energy of a free electron in motion
(c) The energy of electron in the atom is lower than the energy of a free electron of rest
(d) The energy of electron decreases as it moves away from nucleus

65. In which of the following Bohr's stationary state, the electron will be at maximum distance from the nucleus ?

(a) IInd (b) Ist
(c) Vth (d) IIIrd

66. The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to stationary state 1, would be (Rydberg constant = $1.097 \times 10^7\ m^{-1}$)

(a) 406 nm (b) 192 nm
(c) 91 nm (d) 9.1×10^{-8} nm

67. The frequency of radiation emitted when the electron falls from $n = 4$ to $n = 1$ in a hydrogen atom will be (Given : ionization energy of H=2.18×10^{-18} J atom^{-1} and $h = 6.625 \times 10^{-34}$ J s)

(a) $1.54 \times 10^{15}\ s^{-1}$ (b) $1.03 \times 10^{15}\ s^{-1}$
(c) $3.08 \times 10^{15}\ s^{-1}$ (d) $2.00 \times 10^{15}\ s^{-1}$

68. Which of the following transitions of electrons in the hydrogen atom will emit maximum energy ?

(a) $n_5 \rightarrow n_4$ (b) $n_4 \rightarrow n_3$
(c) $n_3 \rightarrow n_2$ (d) all will emit same energy

69. The first emission line of hydrogen atomic spectrum in the Balmer series appears is (R = Rydberg constant)

(a) $\frac{5}{36} R\ cm^{-1}$ (b) $\frac{3}{4} R\ cm^{-1}$
(c) $\frac{7}{144} R\ cm^{-1}$ (d) $\frac{9}{400} R\ cm^{-1}$

70. According to the Bohr theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon ?

(a) n = 6 to n = 1 (b) n = 5 to n = 4
(c) n = 6 to n = 5 (d) n = 5 to n = 3

71. The wavelength (in cm) of second line in the Lyman series of hydrogen atomic spectrum is (Rydberg constant = R cm^{-1})

(a) $\left(\frac{8R}{9}\right)$ (b) $\left(\frac{9}{8R}\right)$
(c) $\left(\frac{4}{3R}\right)$ (d) $\left(\frac{3R}{4}\right)$

72. The shortest wavelength in hydrogen spectrum of Lyman series when R_H = 109678 cm^{-1} is

(a) 1002.7Å (b) 1215.67Å
(c) 1127.30Å (d) 911.7Å

73. What is the expression of frequency (ν) associated with absorption spectra of the photon.

(a) $\nu = \frac{R_H}{h}\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right) n_i > n_f$

(b) $\nu = \frac{R_H}{h}\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right) n_f > n_i$

(c) $\nu = -\frac{R_H}{h}\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right) n_f > n_i$

(d) All the above are correct

74. Bohr model can explain :

(a) the solar spectrum
(b) the spectrum of hydrogen molecule
(c) spectrum of any atom or ion containing one electron only
(d) the spectrum of hydrogen atom only

75. Which of the following statements do not form a part of Bohr's model of hydrogen atom ?

(a) Energy of the electrons in the orbits are quantized
(b) The electron in the orbit nearest the nucleus has the lowest energy
(c) Electrons revolve in different orbits around the nucleus
(d) The position and velocity of the electrons in the orbit cannot be determined simultaneously.

76. Bohr's theory can be applied to which of the following ions.

(a) Na^+ (b) Be^{2+}
(c) Li^+ (d) Li^{2+}

77. Bohr's model is not able to account for which of the following.

(a) Stability of atom.
(b) Spectrum of neutral helium atom.
(c) Energy of free electron at rest.
(d) Calculation of radii of the stationary states.

78. If electron, hydrogen, helium and neon nuclei are all moving with the velocity of light, then the wavelength associated with these particles are in the order

(a) Electron > hydrogen > helium > neon
(b) Electron > helium > hydrogen > neon
(c) Electron < hydrogen < helium < neon
(d) Neon < hydrogen < helium < electron

79. The de Broglie wavelength of a tennis ball of mass 60 g moving with a velocity of 10 metres per second is approximately

(a) 10^{-31} metres (b) 10^{-16} metres
(c) 10^{-25} metres (d) 10^{-33} metres

Planck's constant, h = 6.63×10^{-34} Js

80. If the energy difference between the ground state of an atom and its excited state is 4.4×10^{-4} J, the wavelength of photon required to produce the transition :

(a) 2.26×10^{-12} m (b) 1.13×10^{-12} m
(c) 4.52×10^{-16} m (d) 4.52×10^{-12} m

81. The mass of a photon with a wavelength equal to 1.54×10^{-8} cm is

(a) 0.8268×10^{-34} kg (b) 1.2876×10^{-33} kg
(c) 1.4285×10^{-32} kg (d) 1.8884×10^{-32} kg

82. If the Planck's constant h = 6.6×10^{-34} Js, the de Broglie wavelength of a particle having momentum of 3.3×10^{-24} kg ms^{-1} will be

(a) 0.002 Å (b) 0.5Å
(c) 2Å (d) 500Å

83. The values of Planck's constant is 6.63×10^{-34} Js. The velocity of light is 3.0×10^8 m s^{-1}. Which value is closest to the wavelength in nanometres of a quantum of light with frequency of 8×10^{15} s^{-1}?
(a) 5×10^{-18} (b) 4×10^1
(c) 3×10^7 (d) 2×10^{-25}

84. The de Broglie wavelength of a car of mass 1000 kg and velocity 36 km/hr is :
(a) 6.626×10^{-34} m (b) 6.626×10^{-38} m
(c) 6.626×10^{-31} m (d) 6.626×10^{-30} m

85. Heisenberg uncertainty principle can be explained as
(a) $\Delta x \geq \frac{\Delta P \times h}{4\pi}$ (b) $\Delta x \times \Delta P \geq \frac{h}{4\pi}$
(c) $\Delta x \times \Delta P \geq \frac{h}{\pi}$ (d) $\Delta P \geq \frac{\pi h}{\Delta x}$

86. Heisenberg's uncertainity principle is applicable to
(a) atoms only (b) electron only
(c) nucleus only (d) any moving object

87. The position of both, an electron and a helium atom is known within 1.0 nm. Further the momentum of the electron is known within 5.0×10^{-26} kg ms^{-1}. The minimum uncertainty in the measurement of the momentum of the helium atom is
(a) 50 kg ms^{-1} (b) 80 kg ms^{-1}
(c) 8.0×10^{-26} kg ms^{-1} (d) 5.0×10^{-26} kg ms^{-1}

88. Uncertainty in the position of an electron (mass = 9.1×10^{-31} kg) moving with a velocity 300 ms^{-1}, accurate upto 0.001% will be (h = 6.63×10^{-34} Js)
(a) 1.92×10^{-2} m (b) 3.84×10^{-2} m
(c) 19.2×10^{-2} m (d) 5.76×10^{-2} m

89. The uncertainty in the position of an electron (mass = 9.1×10^{-28} g) moving with a velocity of 3.0×10^4 cm s^{-1} accurate upto 0.011% will be
(a) 1.92 cm (b) 7.68 cm
(c) 0.175 cm (d) 3.84 cm.

90. The Heisenberg uncertainity principle will be most significant for which of the following object ?
(a) Object A of mass 9.11×10^{-30} kg
(b) Object B of mass 9.11×10^{-28} g
(c) Object C of mass 9.11×10^{-24} mg
(d) Object D of mass 9.11×10^{-28} kg

91. The orientation of an atomic orbital is governed by
(a) Spin quantum number
(b) Magnetic quantum number
(c) Principal quantum number
(d) Azimuthal quantum number

92. For which one of the following sets of four quantum numbers, an electron will have the heighest energy?

	n	l	m	s
(a)	3	2	1	1/2
(b)	4	2	–1	1/2
(c)	4	1	0	–1/2
(d)	5	0	0	–1/2

93. Which of the following sets of quantum numbers is correct for an electron in 4f orbital ?
(a) $n = 4, \ell = 3, m = +1, s = +½$
(b) $n = 4, \ell = 4, m = -4, s = -½$
(c) $n = 4, \ell = 3, m = +4, s = +½$
(d) $n = 3, \ell = 2, m = -2, s = +½$

94. What is the correct orbital designation of an electron with the quantum number, $n = 4$, $\ell = 3$, $m = -2$, $s = 1/2$?
(a) 3*s* (b) 4*f*
(c) 5*p* (d) 6*s*

95. Which of the following represents correct set of the four quantum numbers for an electron in a 4*d* subshell ?
(a) 4, 2, 1, 0 (b) 4, 2, 1, – 1/2
(c) 4, 3, 2, + 1/2 (d) 4, 3, – 2, – 1/2

96. The total number of electrons that can be accommodated in all orbitals having principal quantum number 2 and azimuthal quantum number 1 is
(a) 2 (b) 4
(c) 6 (d) 8

97. For azimuthal quantum number $\ell = 3$, the maximum number of electrons will be
(a) 2 (b) 6
(c) 0 (d) 14

98. Which of the following is **not** permissible arrangement of electrons in an atom?
(a) $n = 5, l = 3, m = 0, s = +1/2$
(b) $n = 3, l = 2, m = -3, s = -1/2$
(c) $n = 3, l = 2, m = -2, s = -1/2$
(d) $n = 4, l = 0, m = 0, s = -1/2$

99. Which of the following sets of quantum numbers represents the highest energy of an atom?
(a) $n = 3, l = 0, m = 0, s = +1/2$
(b) $n = 3, l = 1, m = 1, s = +1/2$
(c) $n = 3, l = 2, m = 1, s = +1/2$
(d) $n = 4, l = 0, m = 0, s = +1/2$

100. Which set of quantum numbers are not possible?

	n	l	m	s
(a)	3	2	0	+1/2
(b)	2	2	1	+1/2
(c)	1	0	0	–1/2
(d)	3	2	–2	+1/2

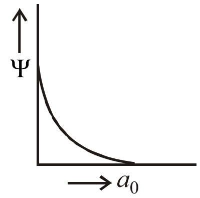
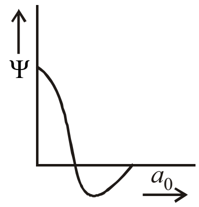
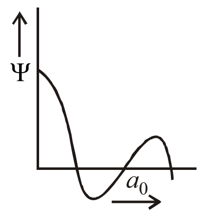
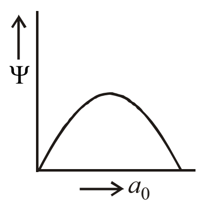
101. What will be the sum of all possible values of *l* and *m* for $n = 5$?
(a) 12 (b) 13
(c) 4 (d) 9

102. The following quantum numbers are possible for how many orbital(s) $n = 3, l = 2$, m = +2 ?
(a) 1 (b) 3
(c) 2 (d) 4

103. The orbitals are called degenerate when
(a) they have the same wave functions
(b) they have the same wave functions but different energies
(c) they have different wave functions but same energy
(d) they have the same energy

104. The number of spherical nodes in 3p orbitals are
(a) one (b) three
(c) two (d) None of these

105. Which of the following graph correspond to one node

(a) 
(b) 
(c) 
(d) 

106. If there are five radial nodes, then what can be the correct representation of the orbital for n = 8.
(a) 8d (b) 8s
(c) 8p (d) 8f

107. What can be the representation of the orbital having 3 angular nodes and $n = 5$.
(a) 5d (b) 5f
(c) 5p (d) 5s

108. The number of orbitals present in the fifth shell will be
(a) 25 (b) 10
(c) 50 (d) 20

109. Arrange the orbital of same shell in the increasing order of shielding strength of the outer shell of electrons.
s, f, d, p
(a) s < p < d < f (b) s > p < d < f
(c) s > p > d < f (d) s > p > d > f

110. Which of the following is not correct for electronic distribution in the ground state ?

(a) Co [Ar] [↑↓] [↑↓][↑↓][ ][ ][ ]
(b) Ni [Ar] [↑↓] [↑↓][↑↓][↑↓][ ][ ]
(c) Cu [Ar] [↑↓] [↑↓][↑↓][↑↓][↑↓][ ]
(d) All of the above

111. The electronic configuration of gadolinium (Atomic number 64) is
(a) [Xe] $4f^8\,5d^0\,6s^2$ (b) [Xe] $4f^3\,5d^5\,6s^2$
(c) [Xe] $4f^6\,5d^2\,6s^2$ (d) [Xe] $4f^7\,5d^1\,6s^2$

112. The order of filling of electrons in the orbitals of an atom will be
(a) 3*d*, 4*s*, 4*p*, 4*d*, 5*s* (b) 4*s*, 3*d*, 4p, 5*s*, 4*d*
(c) 5*s*, 4p, 3*d*, 4*d*, 5s (d) 3*d*, 4*p*, 4*s*, 4*d*, 5*s*

113. The number of *d*-electrons retained in Fe^{2+} (At. no. of Fe = 26) ion is
(a) 4 (b) 5
(c) 6 (d) 3

114. The electronic configuration of an element is $1s^2, 2s^2\,2p^6, 3s^2\,3p^6\,3d^5, 4s^1$. This represents its
(a) excited state (b) ground state
(c) cationic form (d) anionic form

115. Number of unpaired electrons in N^{2+} is
(a) 2 (b) 0
(c) 1 (d) 3

116. An ion has 18 electrons in the outermost shell, it is
(a) Cu^+ (b) Th^{4+}
(c) Cs^+ (d) K^+

117. In a given atom no two electrons can have the same values for all the four quantum numbers. This is called
(a) Hund's Rule (b) Aufbau principle
(c) Uncertainty principle (d) Pauli's exclusion principle

118. The electronic configuration of Cu (atomic number 29) is
(a) $1s^2, 2s^2\,2p^6, 3s^2\,3p^6, 4s^2\,3d^9$
(b) $1s^2, 2s^2\,2p^6, 3s^2\,3p^6\,3d^{10}, 4s^1$
(c) $1s^2, 2s^2\,2p^6, 3p^2\,3p^6, 4s^2\,4p^6, 5s^2\,5p^1$
(d) $1s^2, 2s^2\,2p^6, 3p^2\,3p^6, 4s^2\,4p^6\,3d^3$

119. The orbital diagram in which the Aufbau principle is violated is :

	2s	**2p**
(a)	[↑↓]	[↑↓][↑][ ]
(b)	[↑]	[↑↓][↑][↑]
(c)	[↑↓]	[↑][↑][↑]
(d)	[↑↓]	[↑↓][↑][↑]

120. If n = 6, the correct sequence for filling of electrons will be :
(a) ns → (n – 2) f → (n – 1) d → np
(b) ns → (n – 1) d → (n – 2) f → np
(c) ns → (n – 2) f → np → (n – 1) d
(d) ns → np (n – 1) d → (n – 2) f

121. Maximum number of electrons in a subshell of an atom is determined by the following:
(a) $2l + 1$ (b) $4l - 2$
(c) $2n^2$ (d) $4l + 2$

122. The correct order of increasing energy of atomic orbitals is
(a) $5p < 4f < 6s < 5d$ (b) $5p < 6s < 4f < 5d$
(c) $5p < 5d < 4f < 6s$ (d) None of these